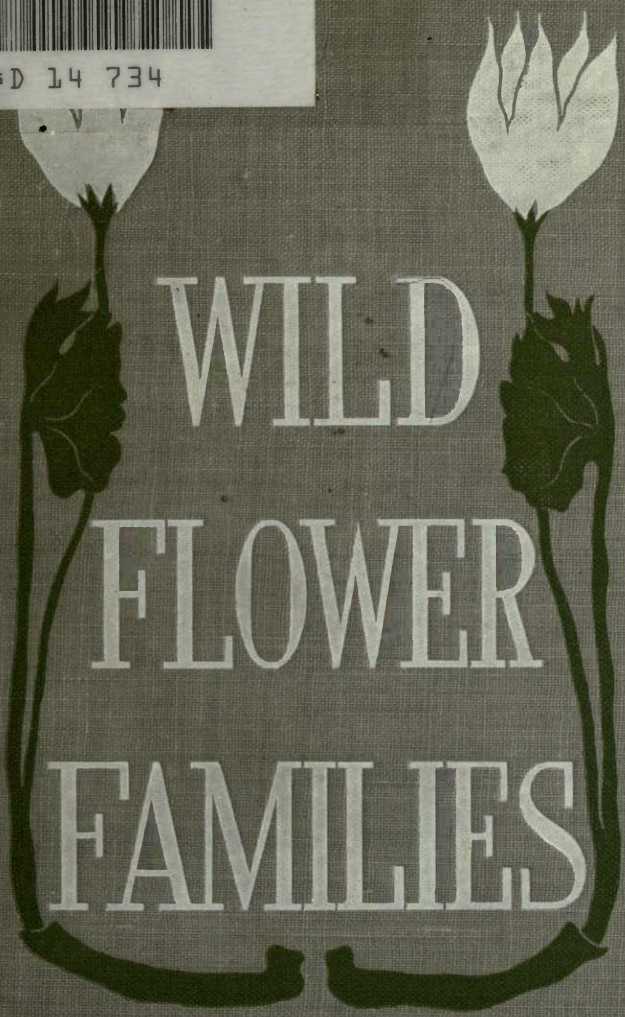
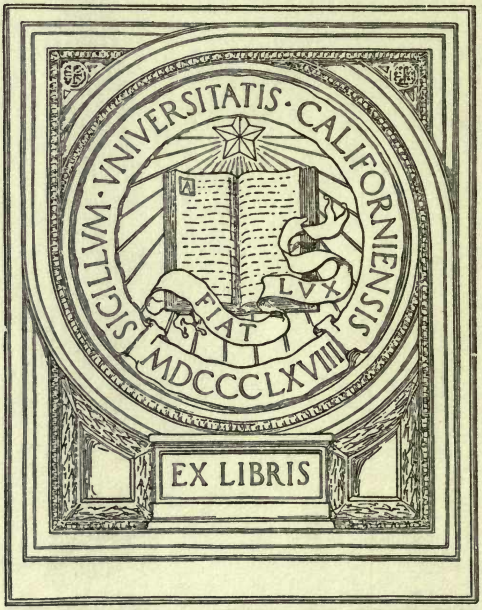
UC-NRLF
$D 14 734



WILD FLOWER FAMILIES

C. M. WEED

GIFT OF
A. F. Morrison



BIOLOGY
LIBRARY

WILD FLOWER FAMILIES

NATURE BOOKS

OUR TREES

HOW TO KNOW THEM

Photographs from Nature

By ARTHUR I. EMERSON

With a guide to their recognition at any season of the year, and notes on their characteristics, distribution, and culture

By CLARENCE M. WEED, D.Sc.

140 Illustrations

Small Quarto *Cloth, $3.00 Net.*

Birds in Their Relations to Man

By

CLARENCE M. WEED *and* NED DEARBORN

Each family of birds is assigned the performance of certain special functions in the economy of nature, and it is to a study of these functions that this volume is devoted. The authors thoroughly outline the services rendered by the various bird families, making it clear at the same time that the investigation by which their information has been secured is the result of the closest scientific methods.

Accurately and lavishly illustrated with full-page plates and drawings in the text.

Cloth, $2.50 net.

J. B. LIPPINCOTT COMPANY

PUBLISHERS :: :: :: PHILADELPHIA

THE VIOLET

WILD FLOWER FAMILIES

THE HAUNTS, CHARACTERS, *and* FAMILY RELATIONSHIPS *of the* HERBACEOUS WILD FLOWERS WITH SUGGESTIONS *for their* IDENTIFICATION

By

CLARENCE M. WEED, D.Sc.,

Teacher of Nature Study in the Lowell, Massachusetts, State Normal School

WITH 83 ILLUSTRATIONS

PHILADELPHIA & LONDON

J. B. LIPPINCOTT COMPANY

1908

QK 118
W4
BIOLOGY
LIBRARY

COPYRIGHT, 1908
BY CLARENCE M. WEED

Published April, 1908

GIFT OF
A.F. MORRISON

Electrotyped and Printed by J. B. Lippincott Company
The Washington Square Press, Philadelphia, U. S. A.

PREFACE

In this little book I have attempted to bring into easily available form a discussion of a large proportion of the more widely distributed herbaceous wild flowers, which should so combine suggestions for observations in the schoolroom and out of doors that it would make the study of the wild flowers of real interest both to teacher and pupils. It is assumed throughout that the pupils shall have an opportunity for a constructive reproduction of their images of the flowers through drawings, written exercises and pressed specimens or photographic prints, which are to be bound into booklets that shall become the personal property of the pupils.

While the arrangement of the various species is that of a grouping into families these families are placed in the sequence of the blossoming of the more important members, so that the season of flowering may be followed in a general way. It has not been deemed advisable to work up the specific questions and directions for study in the case of every species treated, but rather to do so for the more abundant ones which are likely to be available in sufficient quantity for each pupil to

M95639

have specimens for observation. It is believed that the book will be available in any grade from the fifth upward, and that the plan followed will give the teacher opportunity to lay special emphasis upon any phase of the study in which she may be especially interested.

While this little book is primarily intended for the use of pupils in schools for whose benefit the directions in small type are given, it is hoped that it may be found of interest by others who desire to increase or review their acquaintance with the wild flowers. The illustrations are chiefly from original photographs, a few of them, however, having been taken by Dr. H. H. Lamson and Mr. A. H. Verrill, while the drawings were done by Miss Belle S. Cragin with the exception of the one on page 35 which was done by Miss Isabella Phelps.

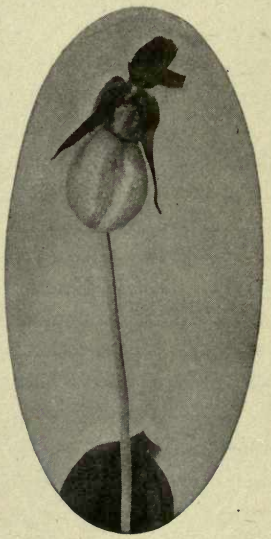
C. M. W.

CONTENTS

		PAGE
INTRODUCTION		13
CROWFOOT FAMILY	*Ranunculaceæ*	31
POPPY FAMILY	*Papaveraceæ*	54
ARUM FAMILY	*Araceæ*	60
SAXIFRAGE FAMILY	*Saxifragaceæ*	71
PURSLANE FAMILY	*Portulacaceæ*	77
HEATH FAMILY	*Ericaceæ*	82
WINTERGREEN FAMILY	*Pyrolaceæ*	86
INDIAN PIPE FAMILY	*Monotropaceæ*	89
ROSE FAMILY	*Rosaceæ*	91
MUSTARD FAMILY	*Cruciferæ*	97
BARBERRY FAMILY	*Berberidaceæ*	97
SPIDERWORT FAMILY	*Commelimaceæ*	98
PHLOX FAMILY	*Polemoniaceæ*	99
LILY FAMILY	*Liliaceæ*	100
LILY-OF-THE-VALLEY FAMILY	*Convallariaceæ*	113
MADDER FAMILY	*Rubiaceæ*	131
VIOLET FAMILY	*Violaceæ*	137
IRIS FAMILY	*Iridaceæ*	148
GERANIUM FAMILY	*Geraniaceæ*	153
BIRTHWORT FAMILY	*Aristolochiaceæ*	157
PRIMROSE FAMILY	*Primulaceæ*	160
MILKWORT FAMILY	*Polygalaceæ*	164
DOGWOOD FAMILY	*Cornaceæ*	167
ORCHID FAMILY	*Orchidaceæ*	171
HONEYSUCKLE FAMILY	*Caprifoliaceæ*	180
PITCHER PLANT FAMILY	*Sarraceniaceæ*	182

PAGE

JEWEL-WEED FAMILY.....*Balsaminaceæ*..... 186
WATER LILY FAMILY.....*Nymphæaceæ*..... 189
WATER PLANTAIN FAMILY....*Alismaceæ*..... 192
DOGBANE FAMILY.....*Apocynaceæ*..... 194
LOBELIA FAMILY.....*Lobeliaceæ*..... 195
MINT FAMILY .....*Labiatæ*..... 196
FIGWORT FAMILY.....*Scrophulariaceæ*..... 199
POKEWEED FAMILY .....*Phytolaccaceæ*..... 206
ST. JOHN'S-WORT FAMILY .....*Hypericaceæ*..... 207
PARSLEY FAMILY.....*Umbelliferæ*..... 208
COMPOSITE FAMILY .....*Compositæ*..... 209
GENTIAN FAMILY.....*Gentianaceæ*..... 228
LIST OF SPECIES..... 233
INDEX..... 241



LIST OF ILLUSTRATIONS

PAGE.

PINK LADY'S-SLIPPER 8
DRAWINGS OF BUTTERCUPS 16
SOLAR PRINT OF WOOD ANEMONE 18
BUTTERCUP BLOSSOMS 21
EVENING PRIMROSE 24
PASTURE THISTLE 26
FLORETS OF COMPOSITE FLOWERS 27
ROUND-LOBED LIVER-LEAF 32
MARSH MARIGOLD 35
WOOD ANEMONES 38
RUE ANEMONE 40
WILD COLUMBINE 42
RED BANEBERRY 45
GOLDTHREAD 46
TALL MEADOW RUE 47
BLOODROOT 55
DUTCHMAN'S BREECHES 57
SWAMP CABBAGE 61
FLOWERS OF SWAMP CABBAGE 63
JACK-IN-THE-PULPIT 65
FLOWER STRUCTURE OF JACK-IN-THE-PULPIT 66
CORMS OF JACK-IN-THE-PULPIT 67
MARSH CALLA 68
EARLY SAXIFRAGE 71
FOAM-FLOWER 73
SPRING BEAUTY 78

Mayflower or Trailing Arbutus 83
One-flowered Pyrola 86
Shin-leaf 87
Wild Strawberry 91
Wild Strawberry Fruits 96
Moss Pink 98
Dog's-tooth Violet 101
Sessile-leaved Bellwort 103
Large-flowered Bellwort 104
Canada Lilies 106
Wood Lily 108
Turk's-cap Lily 109
Yellow Clintonia 114
False Solomon's Seal 116
Wild Lily-of-the-Valley 117
Flowers of Twisted-Stalk 118
Solomon's Seal 119
Large White Trilliums 121
Painted Trillium 123
Purple Trillium 126
Bluets 132
Partridge Vine 134
Drawing of Partridge Berry 136
Blue Violet 139
Bird's-foot Violet 141
Lance-leaved Violet 142
Downy Yellow Violet 144
Bird's-foot Violet 145
Violet Blossom 147
Blue Flag 149
Wild Geranium 154

Wild Ginger 158
Star-flower 163
Fringed Polygala 165
Dwarf Cornel or Bunchberry 168
Pink Lady's-slippers 172
Pink Lady's-slippers in Flower-jar 174
Yellow Lady's-slipper 176
Fringed Orchis 177
Ladies' Tresses 178
Linnæa 180
Flower of Pitcher Plant 183
Arrowhead 192
Self-heal or Heal-all 197
Wood Betony 199
Turtle-head 202
Golden Ragwort 211
White Daisies 213
Cone-flower 214
Chicory 215
Joe-Pye Weed 217
Bicolored Goldenrod 219
Elm-leaved Goldenrod 220
Seaside Goldenrod 221
White Aster 223
New England Aster 225
Closed Gentian 229

INTRODUCTION

One of the most delightful pastimes of the happy season of spring and summer is to find the wild flowers blossoming here and there in the fields and woods. Almost as soon as the snow has melted one can begin the search, for in sunny nooks the Swamp Cabbage sends up its strange flower-heads while the winter's ice still lingers in near-by pools. This is not a very attractive blossom, it is true, except to the small flies that find shelter within its protecting hood. But it is soon followed by the Hepatica, Bloodroot and Arbutus, which surely are attractive to every one who finds them. And after these come the anemones, violets, dandelions and a host of other lovely flowers to make us glad that spring is here again.

I would recommend that each of you who read these pages make a booklet of the wild flowers in your own locality. Go into the fields and woods as often as you can, and find out the answers to the questions suggested in connection with the various flowers. It is not necessary that you go every day, though you are fortunate if you can do so; even once a week is better

than not at all. Learn the names of as many flowers as you can find, and notice in what sorts of places they grow. For before you have been hunting wild flowers long you will find that some kind of blossoms are to be found only in wet places in the woods, while others are to be found only in dry places. And some are to be found in deep shade while others are to be found in open sunlight. So you will find all sorts of variations in the haunts of the wild flowers.

As you watch the flowers week by week you will probably notice that insects are often to be seen about them, getting nectar and pollen. And you will soon see that different sorts of insects occur on different sorts of flowers. This should open to you the fascinating study of the relations of flowers and insects, one of the most interesting subjects for study in the outdoor world.

Another thing that you will be likely to notice is that some flowers remain in blossom much longer than others. By making records in your booklets you will be surprised to see what differences there are in the periods of blooming of the different flowers.

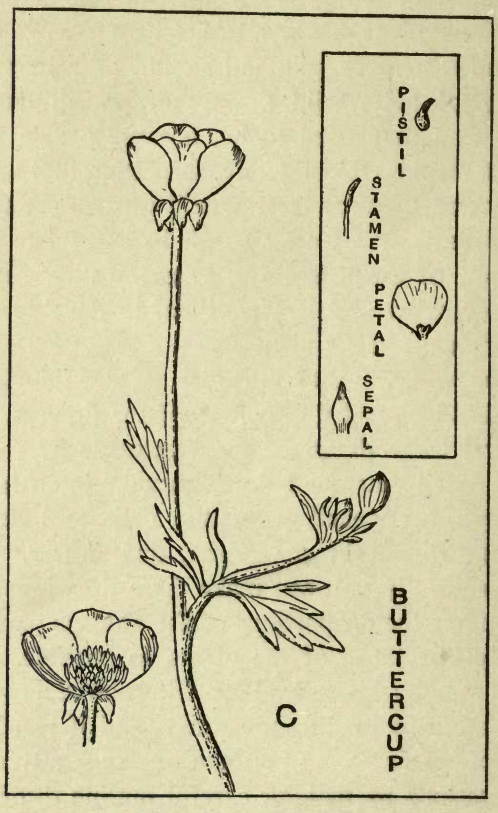
Most of my readers know the Poison Ivy: if not, they should find out what it looks like. Some persons are easily poisoned by touching this plant while others are not. If you are not sure whether it may poison you, be very careful not to

touch it and always be on the lookout for it. It has three leaflets to each leaf while the common woodbine or Virginia Creeper, which is not a poisonous plant, has five leaflets.

And one more point all should bear in mind. Many of these wild flowers are much scarcer now than they used to be, because people have pulled them up so ruthlessly, forgetting that others who were to some later would care to see them and love them. So let us all be careful to pick but few of them, learning to enjoy their beauty as they grow and leaving them to develop seed for the next year's plants.

You will want to illustrate your wild flower booklets by careful drawings of the flowers. In general these drawings may be made by means of a well-sharpened lead pencil, interpreting through the pencil point the delicate lines of growth shown in stem, leaf, and flower. See how carefully you can make these drawings and try to get the proportions of the various parts as nearly like those of the plants as possible. Instead of the black lead pencil, colored crayons may often be used to advantage, and if you have sets of water colors you can get very attractive illustrations by making careful outline drawings with a lead pencil and then filling in with water colors. Good drawings may also be made by means of pen and ink.

These wild flower booklets may of course be made upon almost any kind of paper and of almost



DRAWINGS OF BUTTERCUP

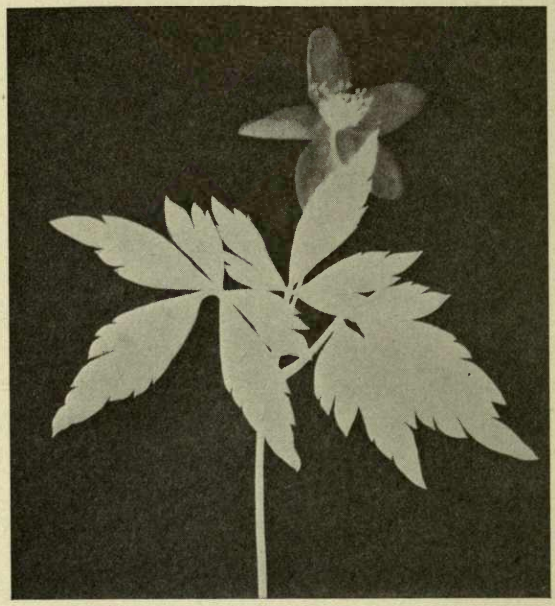
any size. One of the most satisfactory sizes is six by nine inches. It would be very desirable to

bind the books up by means of raffia in covers of thicker paper and of attractive colors, having covers about twelve and a half inches long by six and a quarter inches wide and then folding them in the middle.

You can get some interesting illustrations for your wild flower booklets, especially of the leaves of the wild flowers, by making prints on blue-print paper, or better on van Dyke Solar paper. Such prints are very attractive and will add much to the interest of your booklets.

It will also be worth while to press some of the smaller and more attractive of the common flowers and mount them upon the sheets of which your booklets are made, so that these pressed specimens will be a part of the completed booklet. For pressing such flowers very likely it will be possible to obtain some of the thick botanical drying paper, which can be purchased of any dealer in school supplies, but if this is not available blotting paper or even newspapers will answer very well, and many of the smaller specimens may be readily pressed between the leaves of a book, choosing some old book in which the paper is porous. Your success in drying these specimens so that the colors do not fade will depend very largely upon how often you change the dryers. You can get especially good results by using dryers which have been heated near a radia-

tor or stove or else in the warm sunshine. The specimens may be mounted upon the sheets of paper either directly by means of glue or held in place by bits of gummed paper. Before mount-



VAN DYKE SOLAR PRINT OF WOOD ANEMONE

ing the specimen lay it upon the sheet and see just where you can place it to best advantage and then print carefully its name beside it.

Most of those who use this book have probably had some instruction upon the structure of flowers and know the names of the parts of the

flower. For those who have not had the benefit of such instruction the following brief discussion should be helpful. It will be all the better if the readers, in studying it, have at hand a few buttercup blossoms, so that they can see for themselves just what is meant.

THE PARTS OF THE FLOWER

The Buttercup is an excellent blossom to illustrate the structure of a simple flower. If we have in hand a newly opened Buttercup blossom we will readily find five greenish *sepals* at the base of the flower, which serve to cover it in the bud. When these *sepals* are to be considered as a whole we call them the *calyx*. In many flowers they appear to be united, forming what is called the *calyx-tube*. Such a calyx generally has projections along the outer margin which are called *calyx-lobes* and which usually represent the individual sepals.

Just above the calyx in the blossom of the Buttercup are five yellow *petals*. These form the chief part of the flower so far as conspicuousness is concerned and their special function is to attract insects to the blossom. If one of them is removed there will be found at its base a tiny *nectar pocket* in which nectar is secreted for the visiting bee. As the sepals when taken together are called the calyx, so the petals when taken together are called

the *corolla.* In a large proportion of the wild flowers the petals seem to be more or less united to form the corolla, which commonly has lobes, each lobe representing a single petal.

In the case of many flowers one set of these *floral envelopes,* as the calyx and corolla are sometimes called, is absent. The botanists generally assume that it is the corolla which is absent and call the part present the calyx. If these so-called sepals look like petals they are said to be *petaloid sepals.*

In the case of the Lilies and many related flowers there are three outer sepals and three inner petals which are very similar to one another. The six together are said to form the *perianth* and any one of them is called a *perianth segment.* This seems a rather technical term and it is perhaps allowable to call these perianth segments petals.

Within the circle of the petals in the Buttercup flower there are large numbers of *stamens.* Each stamen consists of a thread-like *filament* with a more or less bag-like *anther* on its end in which is held the powdery *pollen.*

Within the circle of the stamens there are several small *pistils.* The structure of a typical pistil may be well seen in that of a Lily, in which the parts are much more distinct than in the case of the Buttercup. As may be seen in the Lily, a

typical pistil consists of an *ovary* at the base, a *style* in the middle and a *stigma* at the end: within the ovary, as may readily be seen in a cross-section, are the *ovules* which will develop into

BUTTERCUP BLOSSOMS

seeds. In order that this development may take place it is necessary that a grain of pollen should reach the stigma and send a *pollen-tube* down through the style to fertilize the ovules: this process is called *fertilization.* The process by

which the pollen gets from the anther to the stigma is called *pollination.* In case the pollen comes from the same flower it is said to be a case of *self-pollination;* in case it comes from another flower, perhaps upon the same plant but preferably upon another plant of the same species, it is said to be a case of *cross-pollination.* In general we know that flowers exist chiefly in order that they may attract insects to bring about cross-pollination and the consequent cross-fertilization that results. As Darwin said, "nature abhors perpetual self-fertilization."

Cross-pollination may take place through the agency of winds, of birds like the humming-bird, and of insects. The great majority of our common flowers have the pollen carried by insects. Such flowers are said to be *entomophilous* or insect-loving flowers, while those which depend upon the wind for the carrying of their pollen are said to be *anemophilous* or wind-loving flowers.

It not infrequently happens that the nectar in the flower is protected from the visits of ants and other wingless insects, which would not make effective pollen carriers, by some such special device as a fringe of hairs within the corolla or sets of viscid hairs upon the outside of the flower.

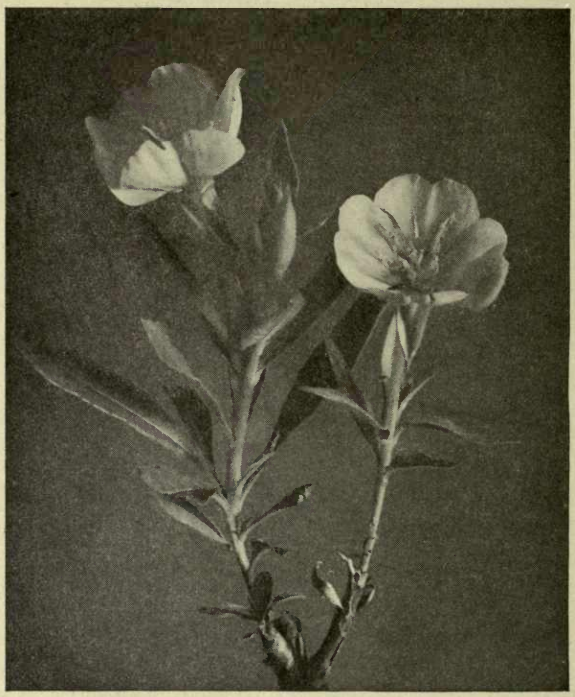
From the point of view of the life relations of the plant three questions may be asked in regard to any flower, namely:

(1) How does this flower prevent self-fertilization?
(2) How does this flower bring about cross-fertilization?
(3) How does this flower prevent robbery of nectar or pollen by ants and other wingless insects?

While the blossom of the Buttercup is very simple in structure, none of the floral elements being united to one another, the Evening Primrose may well serve to illustrate the structure of a flower in which the parts of the calyx seem to be grown together, although it is now thought that this tube represents not the united sepals but a band of leaf tissue. The long, light yellow blossoms are borne on plants varying from one to three or four feet in height. The individual flower is frequently almost two inches long.

The bud is protected by the greenish lobes of the calyx which separate and curl backward as the blossom opens: each lobe is nearly the shape of a long triangle; most of them fall off after the flower is fully open, in which case they are said to be *caducous*. There are generally four light yellow petals, delicate in texture, showing the slender veins and having the margin divided into shallow lobes. Within the petals are eight stamens with long filaments attached to the middle of the slender anthers. The pistil has a long and slender style on the end of which the stigma with its flattened lobes is borne; the latter is covered

in a fresh flower with a viscid liquid to which the pollen grains readily adhere.



EVENING PRIMROSE

The blossoms of this plant generally first open in the evening. The process may be readily seen by a little patient watching: the tips of the sepal-lobes spread apart and soon afterward the petals expand. At this time the flower is fully open

with the petals spread widely out. The next morning, however, the flowers appear to wilt; if the day is cool and cloudy they will only partially roll up, but if the day is cloudless and hot they seem completely to collapse.

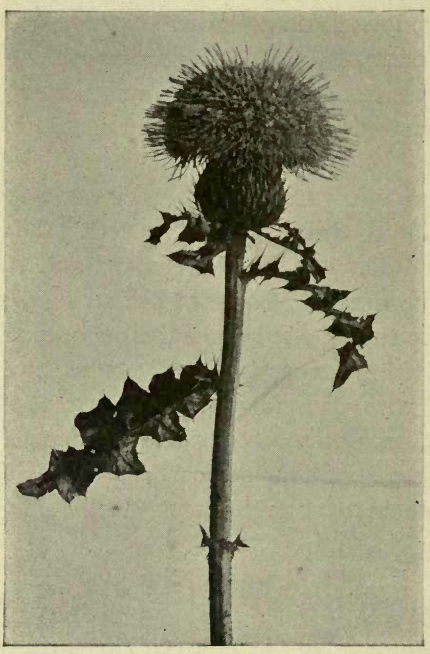
The odor of the Evening Primrose is given off to the greatest extent in the evening, when various long-tongued moths are abroad in search of the nectar which is secreted in the long calyx-tubes of the blossoms. Attracted by the odor the moths easily find the bright yellow flowers. They thrust their tongues behind the stamens and stigma to reach the nectar. Some of the stringy, adhesive pollen is thus dusted upon their mouth parts and carried from flower to flower; when it comes in contact with a viscid stigma it adheres to it.

In this way the moths perform the useful office of cross-pollination, the carrying of pollen from the anthers of one blossom to the stigmas of another.

Besides the moths which thus visit the blossoms in the evening there are a number of bees and flies that may be found upon the flowers in the daytime; some of these come for nectar and some for pollen. They probably assist in cross-pollination to a considerable extent.

There are certain bumble-bees, however, which are not useful as visitors to the Evening Primrose, for, instead of entering at the mouth of the

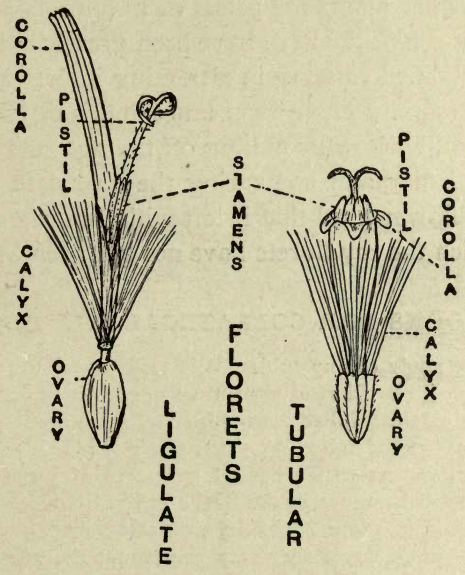
blossom in the legitimate way they alight upon the outside of the flower along the middle of the calyx-tube, biting a hole through it and stealing the nectar.



PASTURE THISTLE

The Dandelion, the White Daisy and the Thistle are examples of still another type of flower structure. These are typical representatives of the great family of composite flowers, in which a large number of tiny flowers, called

florets, are crowded together upon a single head. In the Thistle and in the flowers in the central part of the White Daisy we have illustrations of these florets in which the petals are united into a tubular corolla, as is shown in the right-hand



FLORETS OF COMPOSITE FLOWERS

drawing of the figure above. In the case of the Dandelion the petals are united into a corolla which is tongue-like or strap-like and which is said to be *ligulate*. This is shown in the left-hand drawing of the figure above. If you will look through a simple lens at some of these florets from

almost any good-sized composite flower and compare what you see with these drawings you will be able to make out the structure of the parts of these tiny flowers.

In the case of the Daisy, the Wild Sunflower and similar plants the petals of the florets around the outside of the head have been greatly enlarged and modified to serve in attracting insects to visit the blossom. Their importance in this respect you can readily show by pulling off the ray florets of a white Daisy and comparing the conspicuousness of the flower-head that is left with that of another in which the ray florets have not been removed.

BOOKS FOR COLLATERAL READING

In the study of any subject it is generally desirable that the student should read more than one book in order that he may obtain a fuller knowledge and get a varying point of view. In the following pages there will be found frequent references to the special treatment of various wild flowers which occurs in the books in the list below. It is desirable that these books be available for reference by the students, so that they may follow out the suggestions for study given in these pages.

Blanchan. Nature's Garden. Doubleday, Page & Co.

Dana. According to Season. Charles Scribner's Sons.

Gibson. Blossom Hosts and Insect Guests. Newson and Co.

Higginson. The Procession of the Flowers. Houghton, Mifflin and Co.

Weed. Ten New England Blossoms and their Insect Visitors. Houghton, Mifflin and Co.

For keeping records of the dates of flowering, and of the insect visitors to the various species, the inexpensive *Wild Flower Calendars* designed by the present writer and published by Rand, McNally and Co. will be found helpful.

It has not seemed desirable to burden these pages with scientific names. A list of these, however, will be found on pages 233 to 240. The names there given follow Gray's Manual, and in a few cases they are not generally accepted by botanists. A reference to Britton and Brown's *Flora of the Northern States and Canada* will enable one to learn the accepted names in such cases.

Wild Flower Families

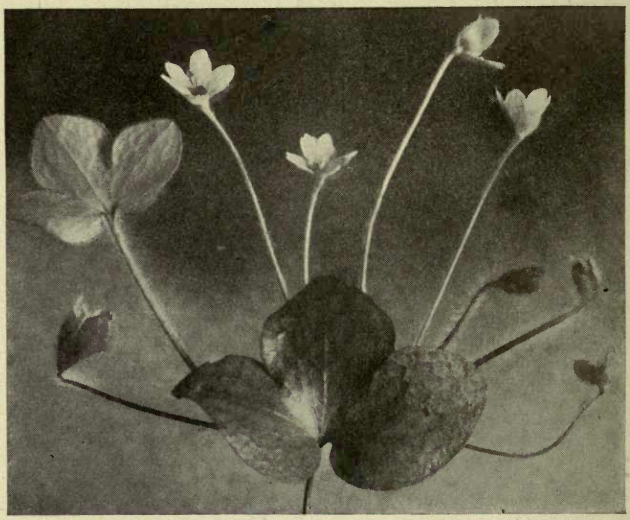
CROWFOOT FAMILY

RANUNCULACEÆ

The Buttercup is a typical example of the great Crowfoot family, which includes a considerable number of our most familiar wild flowers. A large proportion of these are annuals, although some are perennials. They nearly all have acrid juices in the stems and leaves. Both sepals and petals are usually present, the former often being petal-like. A large proportion of the flowers of early spring belong to this family, the Latin name being derived from that of the genus Ranunculus, to which the Buttercups belong.

HEPATICA. The Hepatica or Liver-leaf may fairly claim to be the first of the spring wild flowers. The Swamp Cabbage is not commonly recognized as a flower, and the Bloodroot is too local in its distribution to be universally known, while the Trailing Arbutus is more limited in its geographic range than the Hepatica. Conse-

quently it seems safe to say that for most people the Hepatica is the first wild flower of the season. And it is a very fitting leader for the light-footed procession that is to follow through the golden days of spring. All winter the buds have waited,



ROUND-LOBED LIVER-LEAF

with seeming impatience, the word to start, and as soon as the snow upon the southern slopes begins to disappear these buds creep upward, the three large bracts that cover the blossom open slightly and the tender flowers unclose, revealing the stamens and pistils within.

Quite often these earliest blossoms have to

endure an April snowstorm, a peril that they bravely withstand. Even fire does not subdue them, for they are among the few flowers which appear in spring in woods that have been burned over. One may sometimes see railroad embankments on which the singed and blackened turf is lighted up in early spring with clusters of these blossoms. In such cases one can but wonder how the buds have managed to escape destruction, when even the last year's leaves have been seared by fire. It is true, however, that these last year's leaves have served their purpose, so that their destruction matters little to the plant. The new leaves, snugly folded and densely covered with whitish hairs, just beginning to push up, look like flower buds as they are massed together at the bases of the blossom stems. This velvety covering is an excellent protection in preventing the drying out of the young leaves in winter, and it is evident that it admirably serves this purpose.

As if to show that the procession which it leads is not to be monotonous in its color tones, the Hepatica reveals a charming variation of tints. Many of the blossoms are pure white; others have a pinkish lilac hue; and others, especially those exposed to direct sunshine, exhibit lovely tones of lavender and mauve.

The habitat of the Liverwort seems largely determined by the supply of water. One may fre-

quently find it by the low margins of streams or on the banks of ponds, as well as on hillsides where springs yield sufficient moisture. In damp, open woods the plant is often abundant. Yet it is by no means always to be found in the situations that seem favorable to its growth.

The blossoms of the Liver-leaf yield pollen in abundance and apparently they also have a little nectar for the bees and flies that visit them. They are adapted to a wide range of such visitors: in Illinois eleven species of bees and seven species of flies were seen alighting upon the blossoms of the Sharp-lobed Liver-leaf. Cross-pollination is brought about by these insects, but if none of them happen to go to the flower self-pollination takes place.

Two American species of Hepatica are now recognized by leading botanists: the one in which the lobes of the leaves are rounded is called the Round-lobed Liver-leaf; the one in which the lobes of the leaves are pointed is called the Sharp-lobed Liver-leaf. In both of these species the sepals look like petals, none of the latter being present. One might very easily mistake the three sessile leaves or bracts, which are borne on the stalk below the flowers, for the sepals.

MARSH MARIGOLD. If you would be reminded of that field of Daffodils immortalized by Wordsworth in his famous poem, you should see a spring

landscape adorned with the brilliant blossoms of the Marsh Marigold. In the open fields the trailing water courses are marked by the masses of yellow flowers, while in the woods the marshy places show great vistas of them. In sunlight or in shadow the plant is equally beautiful, its golden bloom mingling with its yellow-green foliage and the lush vegetation of its water-loving neighbors. It generally grows in standing or in slowly running water, the large flowers being held above the surface by the hollow, furrowed stems, which also bear the broad, smooth, round or kidney-shaped leaves.

MARSH MARIGOLD

The blossoms expand an inch and a half and consist of from five to nine petaloid sepals with numerous stamens and five to ten pistils. Both stamens and pistils mature about the same time, but the outer rows of the former shed their pollen before the inner rows. The flowers are freely visited by bright-colored flies, called Syrphus flies, that are abundant in swampy places, these flies being attracted

to the blossoms by their bright color and feeding chiefly on the pollen, although some of them suck the nectar which is secreted in abundance on the sides of the pistils. Small bees and even large bumble-bees are also attracted by this supply of sweetness as well as by the golden pollen. Although self-pollination is possible, cross-pollination appears generally to take place.

For a century or more Marsh Marigolds have been utilized for "greens" in America, having been commonly sold for that purpose under the name of "cowslips" in Boston and New York early in the history of these cities. The name Cowslip, as applied to this plant, is incorrect, however, the English Cowslip being quite a different species.

These Marigolds are always beautiful but there are two situations where they appeal to one with especial force. One is when they outline the course of a shallow meadow run, appearing as a broad yellow stripe through the greening grass. The effect is distinctly decorative, poster-like in the simplicity of its outlines. The other is a picture in the woods seen when, in the midst of a growth of sombre pines, one comes upon a glade sparsely interspersed with Alders, with broad-leaved grasses and sedges furnishing a charming canvas upon which Nature has painted the golden glory of the blossoms, that stand more erect and

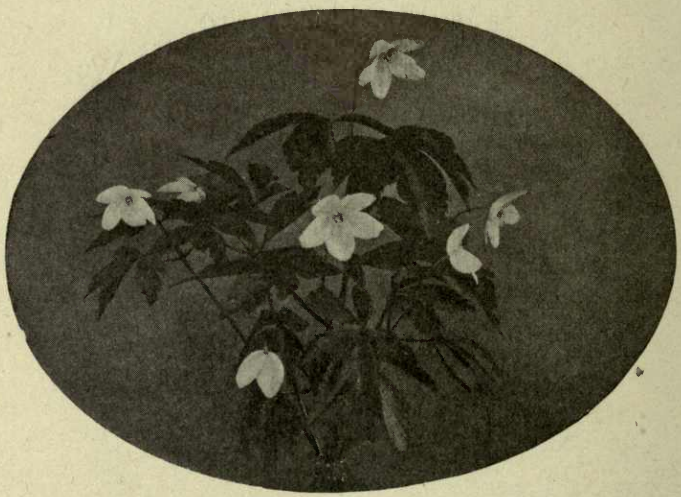
on longer stems than in the open fields. Such a scene, overhung with the drooping catkins of the Birches, among whose branches the brilliant Redstarts are flitting, may well typify the season of spring. It is in just such situations that:

> "The lush marsh marigold shines like fire
> In swamps and hollows gray."

Wood Anemone. The charm of the Wood Anemone is perennial. In early spring its delicate beauty adds a peculiar delight to the borders of woods and untravelled roads. The modest blossoms—white, save where touched to pink or purple by the kisses of the sun—are lightly attached to the slender, arched pedicels, to be swayed by every breath of wind, or to droop more heavily when a bee or fly alights to sip the nectar invisible to human eyes. The leaves, in a whorl of three, spring from the single smooth stem of the plant, taking into their own stems much of the robustness of the main stalk and leaving but a slender pedicel for the support of the flower. Each leaf is divided into three leaflets which in their turn are deeply cut and lobed, permitting great freedom of motion in the wind. The rootstock is perennial and rather slender: it is continually spreading out and sending up new leaves to develop later in blossom-bearing plants. As Professor Bigelow wrote, early in the nineteenth

century: "The whole plant is acriminous to the taste." Possibly this is the reason why the root-stocks used to be recommended for the cure of rheumatism.

We owe to the delicate fancy of the Greeks the name "Anemone"—the wind flower. It is in-



WOOD ANEMONES

teresting to know that a species very similar to our own is found over a large part of Europe, where, as with us, the flowers "are an ornament to many a woodland scene and mountain pasture in April and May."

When the blossoms first open, the stamens are curved over the pistils, but the filaments soon

straighten and leave the stigmas more exposed, so that both anthers and stigmas are mature when insect visitors arrive. These guests are chiefly small bees and flies: both collect pollen and some of the bees appear to find nectar on the receptacle below the pistils.

The time of blossoming of our Wood Anemone has been well indicated by the poet Bryant:

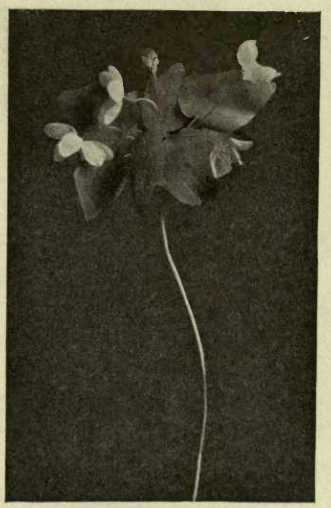
> Within the woods,
> Whose young and half transparent leaves scarce cast a shade,
> Gay circles of anemones dance on their stalks.

And the same picture has been painted by Henry van Dyke in the familiar lines:

> The flocks of young anemones
> Are dancing 'round the budding trees.

Rue Anemone. The Rue Anemone is at once distinguished from the Wood Anemone by the presence of several flowers upon one stalk, in place of the single blossom of the latter. The former is frequently the taller of the two, although it grows in much the same situations, both species often being found intermingled. In the Rue Anemone three to five or more of the small white flowers project in an umbel from the whorl of leaves. There are five to ten of the petaloid sepals, some of which may have the white slightly

tinged with pink. Both the stamens and pistils are numerous and the flower expands half to three-quarters of an inch. The flower stalks are very slender, while the main stem is smooth but considerably thicker. The principal leaves which spring from the root are compound, with the two or three divisions bearing small, rounded leaflets with notches dividing the outer end into three lobes, the middle of which is much the largest. The plant is a perennial with a cluster of tuberous roots that look like miniature sweet potatoes. The flowers seem to be visited by the same sorts of insects that frequent the blossoms of the Wood Anemone.



RUE ANEMONE

False Rue Anemone. In the states of the Middle West the False Rue Anemone is abundant in damp woods, where its patches of white blossoms are among the earliest of the spring flowers and remain in evidence for more than a month. In general appearance it resembles the Rue Ane-

mone but it may easily be distinguished by its roots, which are fibrous rather than tuberous, and by its branching stems from which the flowers arise in different places. The plant is five to ten inches high. The blossoms expand nearly an inch, being white, often slightly tinged with pink, with five petal-like sepals, many stamens and three to seven pistils. Mr. Charles Robertson has found fifty species of insects visiting these blossoms in Illinois. He concludes that the flower is especially adapted to short-tongued insects, which get both honey and pollen from it. In view of these numerous visitors the blossom must be generally cross-pollenized.

Wild Columbine. The Daisy was the flower James Montgomery had in mind when he wrote:

> But this bold floweret climbs the hill,
> Hides in the forest, haunts the glen,
> Plays on the margins of the rill,
> Peeps round the fox's den.

But the lines might well have been written of the lovely Wild Columbine. Along the rocky shores of the New England coast its nodding blossoms color the hillsides in May, the scant soil yielding only sufficient nourishment for a growth of a foot or eighteen inches, while here and there in the richer margin of the rill or along the borders of the forest, scattered plants reach a height of two feet

WILD COLUMBINE

or more. Those which "haunt the glen" vary much in size, according to the strength of their foot-hold, but none are more picturesque than these. As you see the flaming blossoms standing out from the side of the precipitous ledge you wonder that the elements do not tear the plants from their frail supports.

The Columbine is found in blossom from April until June, the height of its season in New England and the northern states occurring in May. The long spurs secrete in their enlarged tips a store of nectar which is eagerly sought by the queen bumble-bees abroad during the period of blooming. Normally, these visitors alight on the open end of the flower, inserting their tongues through the tubes to the spur. As they make the circuit of the five nectar-spurs the under sides of their bodies and their legs rub against the stamens and pistils. In young blossoms the pistils only are extended against the body of the visitor, the stamens being as yet curved up within the flower. These soon curve out, however, so that the abundant pollen is ready to be carried from blossom to blossom. The result of this arrangement is that cross-pollination is very likely to occur through the agency of the bees that bring to newly opened flowers the pollen from those longer open.

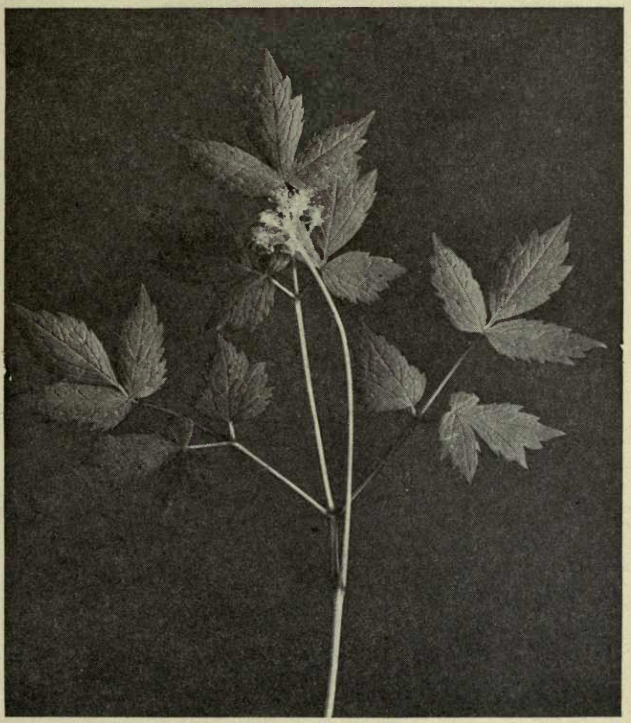
But many bumble-bees bite through the

petal-like substance of the spurs and extract the nectar through the openings thus made. On hillsides where the Columbines are abundant nearly all the flowers may be found so punctured late in the season. But this seldom prevents the maturing of the seed in the curious long and pointed seed pods: for in case neither bees nor humming-birds visit the blossoms in the legitimate manner, the ovules are fertilized by the pollen from the stamens of the same blossom. There are five of the pods which split open when the seeds ripen; the latter are smooth and black. As the seeds are maturing the stems which were arched while bearing the flowers, straighten out to hold the pods erect.

This flower is often called the "honeysuckle," on account of the nectar to be sucked through the spurs when the tip is opened, but this name more properly belongs to another group of plants. In some regions the blossoms are also called "red bells." These flowers are especial favorites of the humming-birds.

BANEBERRIES. In moist, rich woods the White Baneberry is one of the most characteristic plants of the latter part of spring. The smooth, robust, leafless stalk rises from the ground eight or ten inches before it sends out the one large, doubly compound leaf with the margin of its many leaflets cut into numerous serrate lobes, each of which

is tipped with a point. Then the stalk goes on upward to hold the cluster of small white flowers. Later these flowers develop into strange white



RED BANEBERRY

berries with a purplish black tip, which in New England have long been called "dolls' eyes." These berries are poisonous and of course should never be eaten.

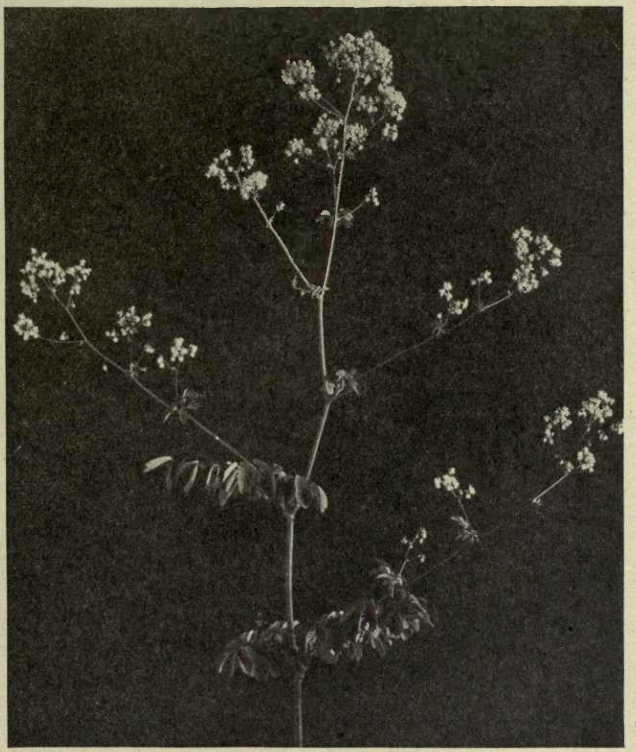
The Red Baneberry is very similar to the White, the chief difference being in its bright red berries which are borne on much more slender pedicels than are those of the White Baneberry.

GOLDTHREAD. The white flowers of the Goldthread are found in abundance in spring in damp, shady places. You may be sure of the species

GOLDTHREAD

when you find the yellow rootstock connecting the plants. The structure of the blossom is peculiar: the sepals are white and petal-like; the stamens are small and numerous; the pistils have large curved stigmatic surfaces. But the petals are most curious: each arises from in front of and between the bases of each pair of sepals, in the form of a miniature column that gradually enlarges

from below and finally ends in a cup-like disc which is yellow with a white center. Over the



TALL MEADOW RUE

surface of the cup is a transparent sticky substance: this is nectar, for these extraordinary petals have been developed into nectaries to feed

the small, two-winged, gnat-like flies that are found in moist places in the woods. These flies carry the pollen from flower to flower as they wander in search of the nectar.

Meadow Rue. In July the great feathery flower masses of the tall Meadow Rue are to be seen in marshy meadows and along the borders of lowland woods. The whole plant gives a very decorative effect to the landscape it adorns. The stems are slender and full of grace, while the foliage is cut into numerous small leaflets rounded behind and notched in front, and the delicate blossoms look like foamy spray. The flowers are not all alike: in general, the more conspicuous white blossoms have stamens but not pistils, while the less attractive greenish flowers have pistils but not stamens. Still others are in a transition stage, having both stamens and pistils in varying numbers. This appears to be a plant which is pollenized both through the agency of the wind and through that of the insects. The species is widely distributed, being found from Labrador to Florida on the Atlantic coast and extending westward to Ohio.

Buttercups. In those happy weeks during the latter part of spring

> "When showers of buttercups
> Are gilding the scene,
> Like showers of gold dust
> Thrown over the green."

one does not need to search far, throughout the Eastern States at least, to find examples of these lovely blossoms. In a given region there are generally several species of Buttercups but the structure of most of them is similar to that of the commonest species, the Tall or Acrid Buttercup. The flowers of nearly all the different kinds are freely visited by a great variety of insects, especially small bees and two-winged flies.

"A little yellow buttercup
Stood laughing in the sun
The grass all green around it
The summer just begun,
Its saucy little head abrim
With happiness and fun."

OBSERVATIONS FOR NOTEBOOK

HEPATICA OR LIVERWORT:

(*A*) 1. What wild flower did you find first in blossom this season?
2. In what kind of situations have you seen the Hepatica growing?
3. Were all the flowers of the same color?
4. How can you distinguish last year's leaves from the new ones of this year?
5. To which species do the plants you have seen belong?
6. Do the flowers close at night and in rainy weather?

7. Have you seen any insects visiting the blossoms?
8. Of what advantage to the plant are the hairs upon the flower-stalk?

(*B*) Write for your wild flower booklet a little essay upon The First Wild Flower. Follow this outline:

Where the Hepatica grows.
When it blossoms.
Structure of flower:
Flower-stalk.
Bracts.
Sepals.
Stamens.
Pistils.
How it attracts insect visitors.
How it excludes wingless visitors.
The new leaves.

(*C*) Make the following drawings for your wild flower booklet: A last year's leaf; A new leaf before it unfolds; A flower.

(*D*) Copy this verse in your booklet:

Brave blue-eyed herald of the tardy spring,
Who while the laggard followers still sleep,
Courageously thy steadfast watch doth keep,
Glad tidings of her first approach to bring.
Emily Shaw Forman.

MARSH MARIGOLD:

(*A*) 1. Where have you seen the Marsh Marigold growing?
2. When does it blossom?
3. Of what advantage to the plant are the hollow, furrowed stems?
4. Are there any hairs upon leaves, stems or flowers?

5. How does the plant prevent the visits of unbidden guests?
6. How does it attract insect visitors?
7. Have you ever seen any such visitors?
8. Can you find nectar in the flower?

(*B*) Write a description of the Marsh Marigold for your wild flower booklet, describing in sequence the stems, leaves and flowers.

(*C*) Make a drawing of the Marsh Marigold. It is an especially good plant for drawing a careful outline with a sharp lead pencil and then filling in with water color. See page 35.

(*D*) Read Chapter II in *According to Season.*

Wood Anemone:

(*A*) 1. In what sorts of situations does the Wood Anemone grow?
2. How early does it blossom?
3. Have you seen any insects visiting the flowers?
4. How are wingless visitors excluded?
5. Has the flower odor? Nectar?
6. What sort of a root has the Wood Anemone?
7. Do the plants blossom the first season that the leaves appear?
8. How can you distinguish the Wood Anemone from the Rue Anemone?

(*B*) Write for your wild flower booklet a description of the Wood Anemone and illustrate it by a careful drawing of the plant.

(*C*) Copy carefuly the verses on page 39.

Wild Columbine:

(*A*) 1. How does the Columbine attract insect visitors?

2. How does it prevent ants and other wingless insects from getting the nectar?
3. Where does it secrete nectar?
4. Has it odor?
5. How is the nectar and pollen protected from the rain?
6. How is cross-pollination insured?
7. Are all the parts of the flower present?
8. What insects visit the blossoms?
9. Have you ever seen any humming-birds visiting the flower?
10. Have you seen bumble-bees biting into the nectar-spurs to steal the nectar?
11. Do bees visit young as well as old blossoms?

(*B*) Write a little essay for your wild flower booklet with some such title as one of these: The Columbine and the Bumble-bees; The Columbine's Visitors; A Rock-loving Plant.

(*C*) Make these drawings: A leaf; A young flower; An older flower. Be sure that your pencil point is sharp and see how well you can express the delicate lines of beauty in the plant.

GOLDTHREAD:

(*A*) 1. In what sorts of situations have you seen the Goldthread growing?
2. What kinds of trees was it underneath?
3. How were the different plants connected with one another?
4. Why should it have the name of Goldthread?
5. Do the leaves remain green through the winter?
6. Were you able to find any insects visiting the flowers?
7. How many sepals are there?
8. How many petals are there?
9. How do these petals differ from the petals of other flowers?

10. How many stamens and pistils are there?
11. What is the color of the pollen?

(*B*) Write a description of the Goldthread, following this outline:

Roots.
Leaves.
Flowers.
Sepals.
Petals.
Stamens.
Pollen.
Pistils.
Nectar.
Use this quotation:

"Could there be anything fresher than the dainty shining foliage of the Goldthread that threads its leagues and leagues of golden runners through the cool shadowy places of the woods?" *Geo. H. Ellwanger.*

(*C*) Make a drawing of a leaf and a flower and in a panel beside the flower stalk make a drawing of one of each of its parts, as seen through a lens.

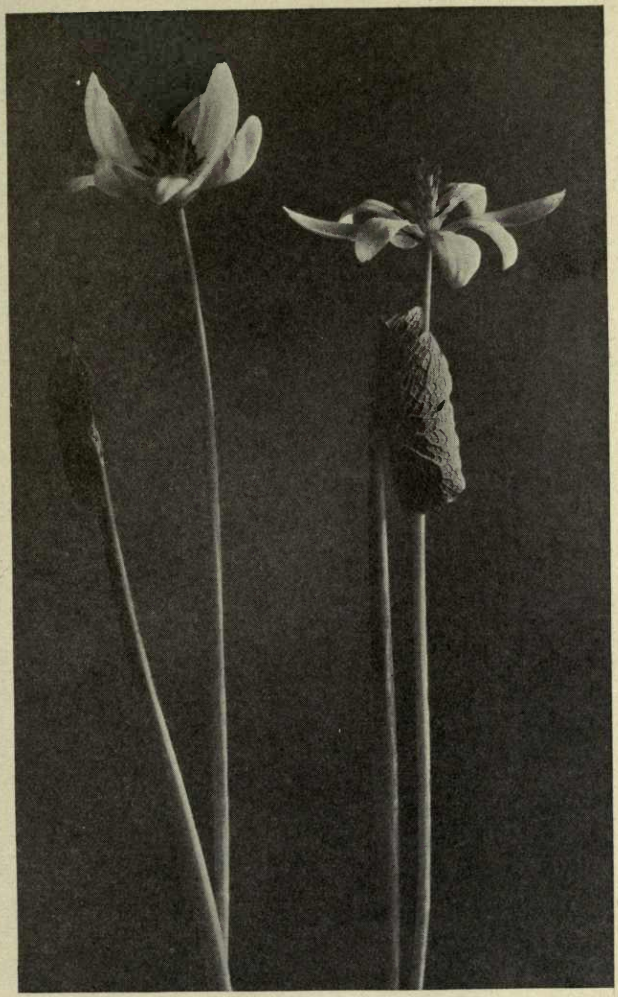
(*D*) Read the account of the Goldthread on pages 68 to 71 in *Ten New England Blossoms and their Insect Visitors.*

POPPY FAMILY

PAPAVERACEÆ

EVERYONE who has seen the Poppies of our gardens in blossom has had an excellent opportunity to note the chief characteristics of the Poppy family. As the blossom buds appear each flower is covered by two large sepals, which generally fall off when the petals open. There are commonly four to six or more petals, which also fall off rather early in the development of the flower, being succeeded by the capsule-like fruit in which the numerous tiny seeds are produced. All members of the family are herbaceous plants and have a sap which is milky or colored in appearance. The group contains comparatively few of our wild flowers, although some of them are very beautiful.

BLOODROOT. The Bloodroot is one of the earliest, as it is one of the most evanescent, of the spring blossoms. In the south it " takes the winds of March with beauty " while farther north it comes with the April showers. When the leaf first appears it is curled over the blossom, enclosing its delicate tissue until both leaf and flower are well above the soil surface. Then, even before the leaf has time to flatten out, the bud shoots upward to unfold its linear petals of glowing



BLOODROOT

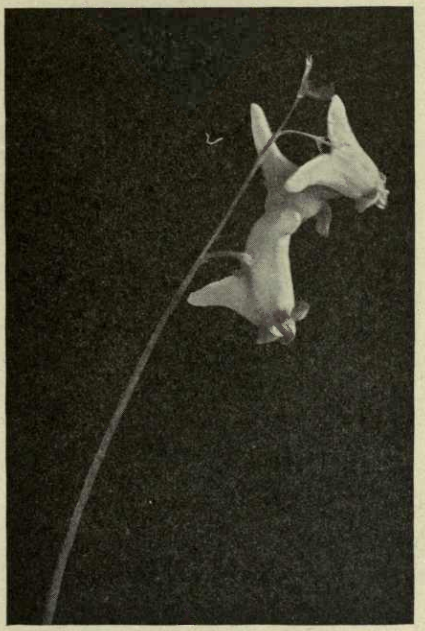
and spotless white. As it appears above the leaf the young flower shows two large sepals that remind one of the Poppy relationship of the species. These greenish white sepals, however, are caducous, being attached to the stalk just below the flower in such a fragile manner that the mere opening of the petals breaks them off.

Even the petals remain for but a little season: they soon fall away and leave the tiny fruits on the end of the flower stalk. When the sun shines brightly the petals project horizontally, but when it is near the horizon or hidden by rain clouds they become vertical.

The Bloodroot blossoms are freely visited for pollen by small bees and certain flies. Cross-pollination generally results because in the newly opened flowers the stigmas mature before the anthers shed their pollen. There seems to be no nectar and the musky odor of the blossom, at least to human smell, is not noticeable out of doors. The way in which the plants grow in clusters renders the flowers much more conspicuous than they would be singly; while by blossoming so early, before the leaves appear upon the trees above them, they are sure to get the benefit of all the sunshine that comes to earth during the uncertain April weather.

After the petals have fallen the fruit ripens and splits apart and the leaves continue to grow

vigorously throughout the season. They are large and flat, well adapted to getting the most benefit from the light that reaches the shady surface on which they live; and they are continually



DUTCHMAN'S BREECHES

storing up, in the large, fleshy rootstocks below, material for future growth. It is on account of this preparation that the plant is able to push up its blossoms so quickly in the spring.

The origin of the common as well as of the

generic name—Sanguinaria—of the Bloodroot is easily appreciated when one digs up the blood-red root that sends its ensanguined juices through the stalks to be transformed to snowy whiteness in the petals.

DICENTRA. The beautiful little White Dicentra which bears the common name of Dutchman's Breeches, is one of the most attractive wild flowers of early spring. Its foliage is cut into many fine divisions that give it a fern-like effect, while its exquisite waxy blossoms form a graceful raceme along the flower-stalk. These blossoms are visited by the early-flying, long-tongued bees which gather the nectar secreted within the flowers. This species is quite generally distributed over the northern states in rich, moist woods. It is sometimes called the Soldier's Cap and occasionally White Hearts.

SQUIRREL CORN. The closely related Squirrel Corn is at once distinguished from the White Dicentra by the shape of the flower. In the Squirrel Corn the posterior lobes of the greenish white blossom, often flushed with pink, are not prominent and do not diverge from each other, as they do in the Dutchman's Breeches. The flowers have a delicate fragrance, suggestive of that of the Hyacinth. The leaves are very similar in the two species and the geographical range is much the same. If you dig up the curious little

tubers, in their shape and color so suggestive of kernels of Indian corn, you will see the appropriateness of the common name of this plant.

OBSERVATIONS FOR NOTEBOOK

BLOODROOT:

(*A*) 1. Where have you seen the Bloodroot blossoming?
2. Does it grow singly or in colonies?
3. Are the flowers always open?
4. What insects have you seen visiting the blossoms?
5. Have you ever seen the fruit of the Bloodroot?
6. Why is the plant called Bloodroot?
7. What relation has the thickened root to the ability of the blossom to appear so early in spring?
8. Do the leaves grow vigorously during the latter part of summer?
9. If so, of what advantage is it to the plant?

(*B*) Write for your wild flower booklet a description of the Bloodroot, following this outline:

Root.
Stems.
Leaves.
Flower.
Sepals.
Petals.
Stamens.
Pistil.

(*C*) Illustrate your description with a drawing of the Bloodroot, showing thickened rootstock, leaf and flower.

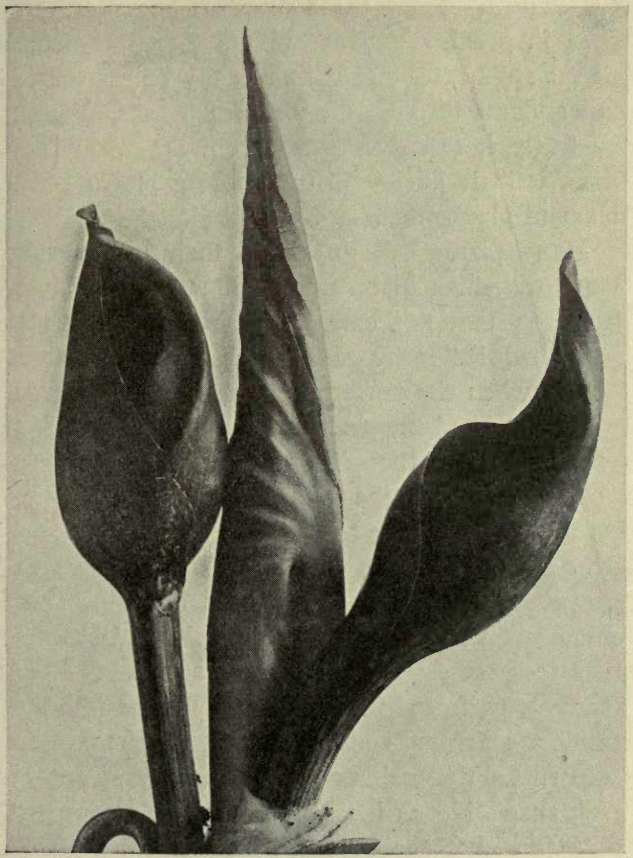
ARUM FAMILY

ARACEÆ

THE Arum family is one of unusual interest on account of the extraordinary structure of the flowers. The common Calla of greenhouses is a familiar illustration of the group, as is also the quaint Jack-in-the-pulpit of swampy woods. In all of these plants the outer part of the flower consists of a large, more or less membranous part called the *spathe,* within which is an erect, club-like part called the *spadix.* On the lower portion of this spadix the stamens and pistils are borne. The rootstock is commonly a tuber or corm-like bulb and the fruit is generally a brightly colored berry.

SWAMP CABBAGE. One of the most interesting members of this interesting family is the Swamp Cabbage or Skunk Cabbage. This is the first of the herbaceous plants to discover the return of spring: in some sheltered corner of a bog, where the surrounding woods keep off the chill March winds, it absorbs the warmth of the sunshine and sends up its strange blossoms long before other flowers have begun to start. The blossoms precede the leaves, which gradually push up as the

days go by, unfolding only as the flowers are beginning to fade.



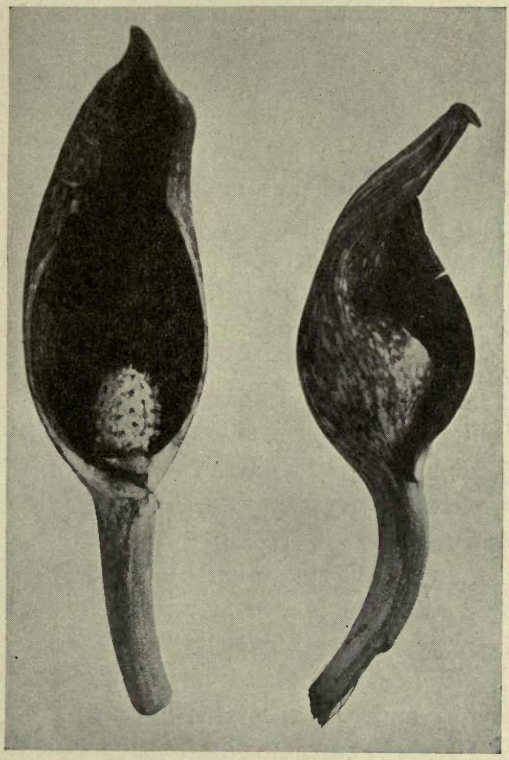
SWAMP CABBAGE

In their structure the flowers of the Swamp Cabbage are peculiar. The large hood-like spathe

encloses the rounded mass of the spadix, which is completely covered by the florets, in which the pistils mature before the stamens. The pollen is shed in great abundance in the closed chamber of the spathe, so that it may easily be carried to other plants through the visits of insects, though evidently it is so protected from the wind that there is little likelihood of its being blown from plant to plant.

Many plants call insects to their aid in this work of pollen distribution. One would think, however, that this early flowering Swamp Cabbage had little chance of such assistance at a season when the northern slopes are yet covered with snow and the sheltered pools are still filled with ice. But the plant has brought about a marvellous adaptation to the conditions of its life. At this early season certain small flies are abundant in the situations where the Swamp Cabbage grows. They fly about in the early spring sunshine and when the weather is cold and stormy they seek such shelter as may be at hand. Now the most perfect shelter that these flies can find is inside the Swamp Cabbage spathes, which are so constructed that neither rain nor wind may enter; and, surprising as it may seem, the blossom not only furnishes shelter from the elements, but it also provides artificial heat. Botanists have found that the purple substance of the spathes

actually gives off heat, so that the temperature inside the blossom is higher than it is outside, even when the wind is not blowing. Conse-



FLOWERS OF SWAMP CABBAGE

quently it is not strange that the flies seek such snug retreats when the sun is hidden by clouds, but come out again when it shines once more.

Now those flies that went into a flower where the pollen had been shed would find the bottom of their retreat thickly covered with the yellow powder. Whenever they move they must dust themselves with this powder and when they leave they must carry much of it on their bodies and legs. Some of this will remain upon them during their brief sojourn in the sunshine, and when they again seek shelter many of them will be likely to enter the chamber of another flower in which the stigmas are receptive. As they walk over the florets of this, the viscid stigmas will catch and retain the pollen grains, and thus the process of cross-pollination will be completed.

There are other visitors also to these early blossoms. Scavenger flies are especially attracted by the color and odor, and very early in spring the common honey bees find it worth their while to visit them.

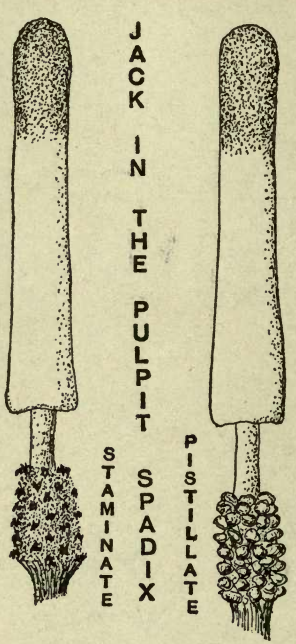
The Swamp Cabbage is of decided interest in another respect. If you attempt to dig up one of the plants you will find that the bulbous root is some distance down, and if you stop to think you will wonder how it came to be so far below the surface. The reason is that the root of this plant is a "burrowing bulb." Soon after the seeds which are developed from the flowers begin to grow in the rich soil of the margin of the bog they form at the base a little bulb, and from the

stem just above this bulb they send downward strong roots that in turn send out from near their tips numerous side branches. When these have become firmly established the main roots contract and thus pull the bulb downward.

JACK-IN-THE-PULPIT

JACK-IN-THE-PULPIT. Every child knows the Jack-in-the-pulpit which is found in blossom so commonly in rich, moist woods during May. The structure of the flower is very similar to that of the familiar Calla, or Calla Lily, of the greenhouse,

the white spathe of the Calla, however, being in this case of a greenish or purplish color and arching over the spadix instead of arching away from it. By taking off the spathe you can readily see



FLOWER STRUCTURE IN JACK-IN-THE-PULPIT

the stamens and pistils on the lower part of the spadix. Sometimes stamens only will be present: sometimes pistils only; while sometimes both are together on the same spadix, but this is unusual.

These flowers are also called Lords and Ladies,

the Lords being the highly colored purple ones and the Ladies the more modest greenish ones.

You can generally find small flies within the Jack-in-the-pulpit blossoms. These carry the pollen from the stamen-bearers to the pistil-bearers and so bring about pollination. After this the stamen-bearing blossoms fade away while the

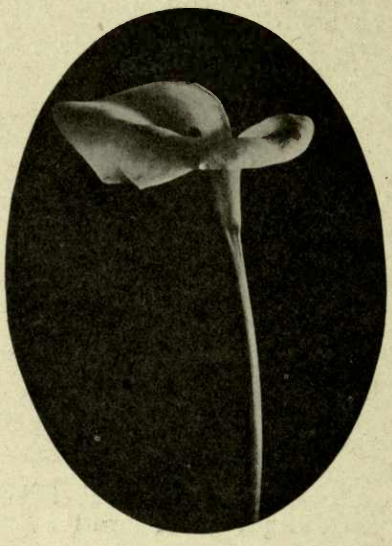
CORMS OF JACK-IN-THE-PULPIT

pistil-bearing blossoms develop green berries which become bright red toward the end of summer.

This plant is a very widely distributed species, being found from Nova Scotia to Florida and west as far as Minnesota and Louisiana.

"Jack-in-the-Pulpit
Preaches to-day
Under the green leaves
Just over the way."

The Green Dragon is a plant closely related to the Jack-in-the-pulpit. It is found locally over a wide range in the United States. In the east it is generally rare, however, and is seldom seen by most plant lovers. The spadix is very long, pro-



MARSH CALLA

jecting much beyond the spathe and giving the plant a striking and characteristic appearance. Its general structure is much like that of the Jack-in-the-pulpit.

MARSH CALLA. A study of the blossom of the curious Marsh Calla, or Water Arum, readily shows its resemblance to its cousins, the Skunk

Cabbage and the Jack-in-the-pulpit, as well as the cultivated Calla of the greenhouse and window garden. Standing erect in the middle of the blossom is the cylindrical spadix bearing the numerous minute florets of a greenish yellow color, and surrounding it is the large white spathe with its pointed tip which gives the flower its chief attractiveness. The thick and succulent heart-shaped leaves are pointed at the tip. The plant is most at home in northern regions in cool bogs and along the borders of shallow, sluggish streams in the woods, where it is often very abundant.

OBSERVATIONS FOR NOTEBOOK

SWAMP CABBAGE:

(*A*) 1. Where have you seen it growing?
2. How early have you seen it blossoming?
3. Was there snow on the ground?
4. Does the snow melt first around these plants?
5. Have you found insects in the flowers?
6. If so, what kind?
7. Can you distinguish between those flower-heads which are in the pollen-bearing stage and those which are in the pollen-receiving stage?
8. Have you ever seen the fruit of the Swamp Cabbage later in the summer?
9. What do the fully expanded leaves look like?

(*B*) Write a short essay for your wild flower booklet, choosing one of these titles: The First Spring Flower; A Strange Family; The Swamp Cabbage.

(*C*) Make one or both of the following drawings: The Swamp Cabbage in early spring; A sectional view, showing the spadix inside the spathe.

(*D*) Read pages 109 to 114 in *Blossom Hosts and Insect Guests*, and pages 369 to 371 of *Nature's Garden*.

JACK-IN-THE-PULPIT:

(*A*) 1. Have you seen the Jack-in-the-pulpit growing in dry or moist situations?
2. How early have you seen it in blossom?
3. Have you ever found any insects inside the spathe?
4. What kinds were they?
5. Were they all alive?
6. Can you distinguish between the pollen-bearing and the seed-bearing flowers?
7. Have you found any in which there were both pollen-bearing and seed-bearing florets upon the same spadix?
8. Have you ever seen the red berries of the Jack-in-the-pulpit late in summer?
9. Why is this plant sometimes called the Indian Turnip?

(*B*) Write a short story for your wild flower booklet with some such title as the following: American Lords and Ladies; A Lover of Brooks; A Brookside Preacher.

(*C*) Make one or more of the following drawings: A whole plant; A sectional view, showing spathe and spadix; A leaf.

(*D*) Read the account of the Jack-in-the-Pulpit on pages 61 to 71 of *Ten New England Blossoms and their Insect Visitors*.

SAXIFRAGE FAMILY

SAXIFRAGACEÆ

THE Saxifrage family is a large group closely related to the Rose family. It contains many species, both of herbaceous and shrubby plants, but definite distinguishing characters are not

EARLY SAXIFRAGE

readily named. It includes a few of our commonest spring wild flowers like the Early Saxifrage, the Bishop's-cap, and the Foam-flower, as well as a number of wild and cultivated shrubs like the Currant and the Gooseberry, the Mock Orange and the Hydrangea.

EARLY SAXIFRAGE. The rock-loving Early Saxifrage is an abundant plant in the eastern states, especially in hilly or mountainous regions. It will flourish where there is very little soil to hold it in place and is one of the flowers most likely to be found in early summer toward the tops of rocky hills and mountains. It prevents nectar robbery by ants and other wingless insects by the sticky hairs upon the main stems. Its flowers are adapted to the visits of short-tongued winged insects of many kinds and cross-pollination is insured by the fact that the pollen is shed before the stigmas mature.

SWAMP SAXIFRAGE. The Swamp Saxifrage differs strikingly from the Early Saxifrage in its choice of habitation, being found along the borders of swamps and in other wet places and having rather long, narrow, obtusely pointed leaves from between which the flower stalk rises to a height of one or two feet and bears an abundance of small greenish flowers. This species is rather widely distributed, being found from Maine to Minnesota on the north and from Virginia to Missouri on the south.

FOAM-FLOWER. An example of a peculiarly fitting name is found in Tiarella, the Foam-flower, which is also often called the False Mitrewort. To appreciate the former name you should see it growing in great masses in damp places in the

FOAM-FLOWER

woods, when the hundreds of thousands of tiny white flowers give the appearance of a sheet of

foam. Such a sight is one of the most beautiful and characteristic of those to be seen in the May woods. The flowers are borne in masses on the end of a stalk about eight inches high, while the round or heart-shaped leaves, with many points, are borne on stems of about the same length. The species is found from Nova Scotia to Georgia, west to the Mississippi Valley.

MITREWORT. The tiny flowers of the Mitrewort, or Bishop's-cap, have well been likened to minute white crystals. They are strung singly on short stems, along the main flower-stalk, making much less show than do the Foam-flowers. The two plants are found in the same sort of situation, however, being especially common in wet places in rich woods, from Canada to Kentucky. When the petals drop off the tiny fruit pods form miniature mitres or bishop's-caps, from which the plant gets its names. The time of blossoming of these flowers is indicated by Longfellow in this verse:

> At Pentecost, which brings
> The Spring, clothed like a bride,
> When nestling buds unfold their wings,
> And bishop's caps have golden rings,
> Musing upon many things,
> I sought the woodlands wide.

There are two species of Mitreworts: the Two-leaved Mitrewort has two opposite leaves upon the flower stalk; the Smaller Mitrewort lacks these.

OBSERVATIONS FOR NOTEBOOK

EARLY SAXIFRAGE:

(*A*) 1. In what sorts of situations is this plant most likely to be found?
2. How is cross-pollination brought about?
3. How is self-pollination prevented?
4. How are ants and other wingless insects prevented from stealing the nectar?

(*B*) Write a little essay for your wild flower booklet with this title: A Rock-loving Plant. In your essay answer the questions given above.

(*C*) Make a careful drawing of one of the plants, showing leaf, stem and flowers.

(*D*) Transplant one of the plants that is just beginning to blossom into a shallow dish, water it every day and watch the development of the flowers. Afterwards set it out in the wild garden.

FOAM-FLOWER:

(*A*) 1. Where have you seen the Foam-flower growing in most abundance?
2. Do you think this common name a fitting one?
3. Are all the parts of the flower present?
4. What is the color of the stamens and pollen?
5. How can you distinguish the Foam-flower from the Mitrewort?
6. What other plants are likely to be found in blossom among or immediately surrounding the Foam-flowers?

(*B*) Write a short description of the Foam-flower and illustrate it by a careful drawing of leaf, stem and blossom.

MITREWORT:

(*A*) Make a careful drawing of a leaf or two and a blossom-bearing stalk at the left of the middle of one of the sheets which are to go into your booklet. To the right of the drawing print carefully the verse by Longfellow on page 74.

Come ye into the summer woods;
There entereth no annoy;
All greenly wave the chestnut leaves,
And the earth is full of joy.

I cannot tell you half the sights
Of beauty you may see,
The burst of golden sunshine,
And many a shady tree.

Mary Howitt.

PURSLANE FAMILY

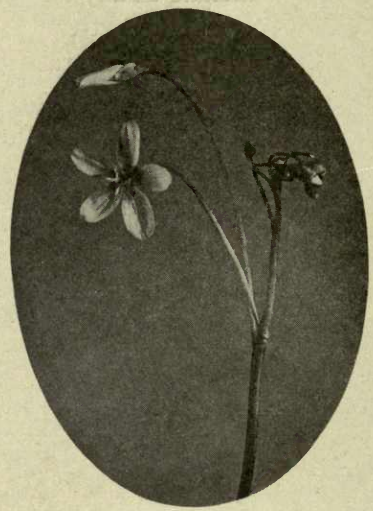
PORTULACACEÆ

ALTHOUGH the Purslane family is a comparatively large group it contains but two species of wild flowers which are widely distributed in the United States. The characters of the family are fairly well illustrated by the familiar Pussley, one of the worst of our garden weeds, and the almost equally familiar Portulacca of our flower-beds. The latter is indeed very closely related to the former, and in some localities it has escaped from gardens to become a wild flower. Most of the members of this family have more or less thickened leaves and stems and the flowers are commonly composed of two sepals, four or five petals, an equal number of stamens and one pistil.

SPRING BEAUTIES. Two species of Spring Beauty or Claytonia commonly occur in the United States. The Virginia Spring Beauty has a wider distribution than the Carolina Spring Beauty and is the species most commonly found in the middle and western states. In New England and the eastern region generally the Carolina form is the one usually present. The two species resemble each other, differing chiefly in the shape of the leaves: in the Virginian form these are

four or five inches long, and linear-lanceolate in shape; in the Carolinian form they are two or three inches long, and ovate-lanceolate in shape. The blossoms are very similar.

The Spring Beauty is an excellent example of what the botanists call *protandry*,—that is, the



SPRING BEAUTY

shedding of the pollen by the stamens before the the stigma opens. The first day that the petals unfold the stamens stand erect around the pistil, and are already shedding their pollen. But the three-lobed stigma of the pistil is not exposed; the stigmatic surfaces are tightly pressed against each other. On this first day the bees visit the

blossom to plunder it of pollen and nectar, but on account of the closed stigmas they cannot fertilize the ovaries of the pistil, either with the pollen of the same or that from another flower. On the second day the filaments have bent outward in such a way as to press the anthers against the petals, and thus to keep them away from the stigmas which have now opened. If at this time the flower is visited by a bee more or less covered with pollen from another plant, some of the pollen-grains will pretty surely be brushed upon the stigmatic surface, and in consequence cross-fertilization will result. The statement has frequently been made that the closing of the petals must bring about self-fertilization, but this in general is not the case. Mr. Charles Robertson, who has studied with his usual care the pollination of the Virginia Spring Beauty, has said: "If self-fertilization by closing of the flower occurs, it is after the anthers have been exposed to insects for two days and the stigma for one, but many flowers which I marked exposed their stigmas again on the third day, showing that fertilization of any kind had failed on the day before." My own observations on the Carolina Spring Beauty indicate a similar behavior of the flowers of this species.

The blossoms of the Spring Beauty are visited by an extraordinary number and variety of in-

sects: in the case of the Virginia Spring Beauty Mr. Robertson has recorded seventy-one species of such visitors. The workers of the common honey bee are among the most abundant of these, frequenting the flowers in quest of both nectar and pollen. Various species of queen bumble-bees are also to be found, as well as numerous kinds of smaller bees. Thirty-one species of two-winged flies were seen, most of them making use of both nectar and pollen, while nine sorts of butterflies came to suck the nectar. Even the little Spotted Ladybeetle came to feed upon the pollen.

Like so many other plants the Spring Beauties sometimes exhibit decided variations in the parts of the flower. In Michigan pure white flowers smaller than usual have been found, with short filaments and abortive anthers.

OBSERVATIONS FOR NOTEBOOK

SPRING BEAUTY:

(*A*) 1. Which species of Spring Beauty occurs in your locality?
2. How does the plant prevent self-pollination?
3. How does it bring about cross-pollination?
4. How does it prevent nectar robbery by ants?
5. Do the stripes on the petals lead toward the nectar?
6. What insects have you seen visiting the flowers?

7. In what sort of situation do the plants grow most abundantly?
8. Did you ever see patches of leaves from which very few flowers develop? If so, how do you account for it?
9. Make a diagram showing the way the petals overlap in the bud. Is there any variation in this respect?

(*B*) Write a description of the Spring Beauty and illustrate it by drawing or drawings of leaf, stem and flowers.

(*C*) Read the chapter on The Spring Beauty on pages 33 to 50 in *Ten New England Blossoms and their Insect Visitors.*

As flow'rets bent and closed by chilling night,
Soon as the sun his radiance hath bestowed,
Rise on their stems and opening hail the light;
Thus to my wearied breast fresh vigor ran.

Dante.

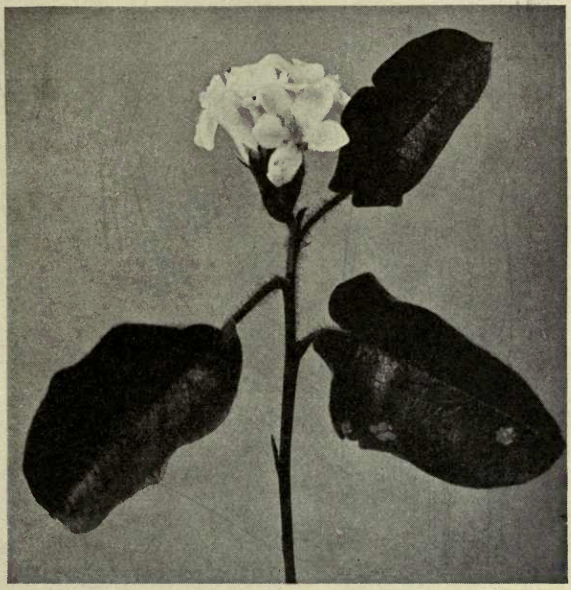
HEATH FAMILY

ERICACEÆ

THE Heath family, as now restricted by botanists, includes a number of shrubby plants having attractive flowers and for the most part blossoming in early spring. While technically the woody stems of the Mayflower or Trailing Arbutus cause it to be classed among the shrubs, rather than among the herbaceous plants, the blossoms are so generally prized as wild flowers that it seems desirable to include a discussion of it in these pages.

TRAILING ARBUTUS. The Mayflower or Trailing Arbutus is familiar to everyone in New England and many of the northern states. In regions where it is abundant it is the one blossom that is gathered by all, its delicate beauty charming the eye as its delightful fragrance appeals to the sense of smell. All winter the buds lie hidden beneath the snowdrifts waiting to unclose: soon after the white mantle on the southern slopes becomes spotted with brown these buds begin to open and become fully developed blossoms while the snow still lingers on the northern slopes. Then for a month the Arbutus is the Queen of Spring, a lovely and modest queen withal, serenely enduring many a storm of wind and rain.

The leaves of the Mayflower are leathery in texture, though not very thick. The leafstalks as well as the main stems are covered with rather long brown hairs, having curved tips. The blossoms are crowded together at the end of the pros-



MAYFLOWER OR TRAILING ARBUTUS

trate stem, in bunches of three to eight or more, which are often hidden by the leaves. The blossoms are interesting because of the irregularity of the stamens and pistils: each set of these essential organs varies greatly in different flowers.

They are freely visited by queen bumble-bees

which commonly bring about cross-pollination, although strangely enough seedlings of the Mayflower are very rarely seen. The visits of ants and other unbidden guests are prevented by the hairs inside the corolla.

It is a pity that so many people greedily or thoughtlessly pull up these lovely blossoms by the armful, and thus soon exterminate the plant in regions where it should be abundant.

Yet "God be praised!" the Pilgrims said,
Who saw the blossoms peer
Above the brown leaves dry and dead,
"Behold our Mayflower here."
John Greenleaf Whittier.

OBSERVATIONS FOR NOTEBOOK

TRAILING ARBUTUS:

(*A*) 1. In what sorts of situations are the finest Mayflowers found?
2. In what sorts of situations do the blossoms first appear?
3. Have you ever seen bumble-bees visiting the flowers?
4. Do all the flowers have well developed stamens?
5. Do all the flowers have perfectly developed pistils?
6. Can you find any flowers which contain both pistil and stamens perfectly developed?
7. What is the significance of the hairs found on the inside of the corolla?

8. Where is the nectar secreted?
9. How is the odor of the flower useful to the plant?
10. How do the leaves compare in texture with the leaves of most of the spring wild flowers?

(*B*) Write for your wild flower booklet a little essay concerning the Mayflower, using the following outline:

Where it grows.
When it blossoms.
Description of stem and leaf.
Description of flowers.
How it attracts bumble-bees.
How it prevents ants from stealing nectar.

(*C*) Illustrate this essay with these drawings: Leaf and flowers attached to the stem; Longitudinal cross sections of two flowers, showing the variations of pistil and stamens; or a longitudinal cross section of the corolla, showing the hairs projecting from its inner surface.

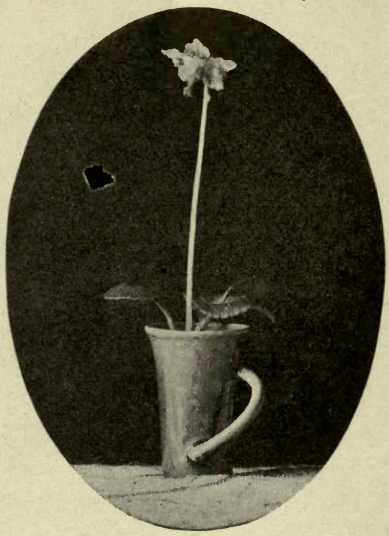
(*D*) Read the account of the Mayflower found on pages 18 to 32 of *Ten New England Blossoms and their Insect Visitors.*

(*E*) Copy into your booklet the lines on page 84 and any other verses concerning the Mayflower you can find.

WINTERGREEN FAMILY

PYROLACEÆ

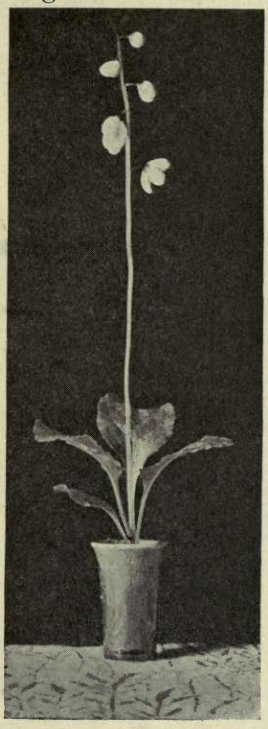
UNTIL quite recently, and even yet in some books, this family is treated as a part of the great Heath family, but is sufficiently distinctive to



ONE-FLOWERED PYROLA

stand by itself. Several members of the group are shrubs while the others are evergreen herbs. The petals of the corolla are not united to each other and the calyx is free from the ovary. There are many seeds in the fruit.

ONE-FLOWERED PYROLA. I like to call the One-flowered Pyrola by the name which was given it by Dr. Asa Gray, the greatest of American botanists. He named it *Moneses,* which means "single delight," showing his appreciation of the beauty of this little woodland fairy that springs up singly or in groups in the cool pine woods of the northern states. The wax-like blossom shows its relationship to the other Pyrolas, from which, however, it is easily distinguished by the single flower on each stalk.



SHIN-LEAF

ELLIPTICAL-LEAVED PYROLA. The curious name of the Shin-leaf given the Elliptical-leaved Pyrola is due to an old custom by which its leaves were applied for healing bruises on the human body. When in flower in midsummer it is a beautiful plant, being found in rich woods from the Rocky Mountains eastward.

ROUND-LEAVED PYROLA. The False Wintergreen or Round-leaved Pyrola bears a general

resemblance to the Shin-leaf. Its fragrant white flowers are borne in a spike on a stem varying greatly in height, though averaging perhaps twelve inches. The plants are found in open woods, over an area extending from Nova Scotia and Minnesota on the north to Georgia and Ohio on the south.

Oh! wherefore were the flowers made,
All dyed with rainbow light,
All fashioned with supremest grace,
Upspringing day and night;

Springing on valleys green and low,
And on the mountains high,
And in the silent wilderness
Where no man passes by?

God might have made the earth bring forth
Enough for great and small,—
The oak tree and the cedar tree,
And not a flower at all.

Mary Howitt.

INDIAN PIPE FAMILY

MONOTROPACEÆ

WHO has not wondered at the strange, ghost-like beauty of the Indian Pipe as the plant rises from its bed of brown needles in the shadow of the pines. It seems to belong to the tribe of mushrooms and toadstools rather than to that of the flowering plants. But a little looking will show the organs of the flower in the bowl of the pipe, so that one must recognize its claim of kinship with the flowers. But one who knows that the flowering plants as a whole get their beauty through the action of sunlight on the green leaves will readily believe that this white plant is a parasite, robbing the roots of other plants of their sap in order that it may grow, or else, like the toadstools, sucking up the material of decaying plants and so becoming a saprophyte.

PINE SAP. This Indian Pipe was formerly included in the Heath family but it is so curious and distinctive that it is now placed in a family of its own which includes but two species—the Indian Pipe and the Pine Sap or False Beech Drops. The strange plants of the latter are often to be found in shady woods, being of a rather reddish hue, somewhat fragrant and generally from six

to ten inches high. Both of these species are parasites upon the roots of trees, which accounts for their lack of the green coloring matter, called chlorophyll, which is characteristic of plants that get their own living from the earth and air.

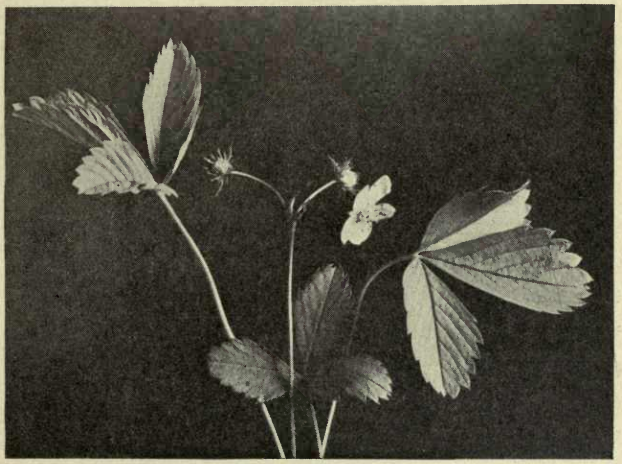
Look! white Indian pipes
  On the green mosses lie!
Who has been smoking
  Profanely so nigh?
Rebuked by the preacher
  The mischief is stopped,
But the sinners, in haste,
  Have their little pipes dropped.
Let the wind, with the fragrance
  Of fern and black birch,
Blow the smell of the smoking
  Clean out of the church!

Clara Smith.

ROSE FAMILY

ROSACEÆ

One who has noticed the structure of the flower of the beautiful wild rose or who has studied with any care the equally beautiful apple blossoms has



WILD STRAWBERRY

gotten an idea of the structure of a typical example of the Rose family, which includes a large number of trees and shrubs as well as a few herbaceous wild flowers. All the parts of the flower are present, there being five sepals and five petals, many stamens and one or more pistils.

WILD STRAWBERRY. The wild strawberry is so universally distributed in open ground and along the borders of woods that we scarcely think of it as a wild flower. Yet the common field strawberry is a native American species, having been described many years ago as the Virginian Strawberry. The first of the familiar white flowers bloom early in spring; the full crop of blossoms appears in May and the fruit ripens in June. The flowers have a delicate odor and are visited by a great variety of bees, flies, and other insects, while the fruit is eaten by many kinds of birds by which the seeds are scattered far and wide.

NORTHERN WILD STRAWBERRY. In the more northern states a delicate species, sometimes called the Northern Wild Strawberry, is also commonly found. It is much smaller than the other, with thinner and lighter green leaves that have comparatively few hairs upon their surface. The cluster of flowers rises above the leaves, while the fruit is slender and pointed, the seed-like achenes resting on the surface and not being sunken into tiny pits as they are in the Virginian Strawberry.

If you compare the structure of one of these delicious strawberry fruits with a blackberry or a raspberry you will see how differently they are made up. In the former the hundreds of tiny seed-like achenes are distributed over the surface

of the enlarged *torus*—the end of the flower-stalk—which forms the edible part of the fruit, while in the latter there is an edible pulp surrounding each tiny seed.

CINQUEFOILS. Several distinct species of Potentilla or Cinquefoil are abundant over a large part of the northern states and Canada. The two most important from our present point of view are the Common Cinquefoil and the Silvery Cinquefoil.

The Common Cinquefoil has yellow flowers, nearly half an inch in diameter, that resemble miniature strawberry blossoms in their structure, although the color of the petals is so different. Like the strawberry, too, the plant spreads over the ground by long and slender runners, which often produce a thick carpet of plants in fields and along highways, the running stems being smooth and almost wire-like. The name Cinquefoil is from the French and means five-fingers, so called because of the five-parted leaf so characteristic of the plant, which indeed with us is quite generally called the Five-fingers.

The Silvery Cinquefoil is at once distinguished by its whitened appearance, especially on the smaller stems and the lower surface of the leaves. The yellow flowers are only about a quarter of an inch in diameter and are borne on short, slender stems. Like the Common Cinquefoil the species

is widely distributed over the Northern States and Canada.

The Rough or Norway Cinquefoil is a third abundant species, though it is to be ranked as a weed rather than a wild flower. It is a robust, erect plant, having a coarse appearance that at once distinguishes it from either of the above named species. There are three leaflets to each leaf. The styles are glandular and thickened below, and there are about twenty stamens in each flower.

The Barren or Dry Strawberry of the genus Waldsteinia has a habit of growth similar to that of the Common Cinquefoil, but is at once distinguished by its *three* leaflets. It is widely distributed in sparse woods and uncultivated fields as far west as Minnesota and as far south as Georgia.

OBSERVATIONS FOR NOTEBOOK

WILD STRAWBERRY:

(*A*) 1. How early does the Wild Strawberry come into blossom?
2. Over how long a period does it blossom?
3. Is there much variation in the number of pistils and stamens in different flowers?
4. What insects have you seen visiting the flowers?

5. Have you noticed the odor of these blossoms?
6. Is there any nectar secreted?
7. How early do the first berries ripen?
8. How does the structure of the berry differ from that of the currant or the blackberry?
9. How do the strawberry plants and fruits growing in moist places differ from those growing on dry hillsides?
10. In what ways may new strawberry plants be formed?
11. How many new plants do you suppose may develop in one season from the runners sent out by one plant?
12. How does the cultivated strawberry differ from the wild one?

(*B*) Write a little essay for your wild flower booklet, describing the year's history of wild strawberry plants. Begin with the winter season when they are covered with snow and tell how, after the snow goes in spring, they send up their blossoms to attract insect visitors; how these visitors carry the pollen from flower to flower and thus cause the fertilization of the tiny ovules and their development into seeds; how the part beneath the seed develops into the fruit, which attracts birds to eat it and thus leads to the scattering of the seeds in other places; then how the plant, having ripened its fruit, begins to send out runners in all directions, from which many new plants develop, and finally in autumn takes a rest after the summer's work.

(*C*) Illustrate your essay with drawings of the strawberry leaf, blossom, fruit, runner and new plant.

(*D*) Read the account of the development of the cultivated strawberry on pages 424 to 452 of *The Evolution of Our Native Fruits* by L. H. Bailey.

COMMON CINQUEFOIL:

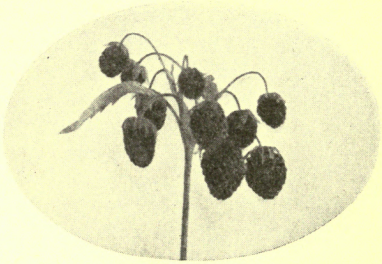
(*A*) 1. Why should you think that the Common Cinquefoil and the Wild Strawberry are closely related plants.

2. What insects visit the blossoms?

3. What sort of fruit does the Cinquefoil develop?

4. Why does it so often form a thick mat of plants in open fields?

(*B*) Write a description of the Common Cinquefoil and illustrate it by drawings of the leaves and flowers.



MUSTARD BARBERRY, SPIDERWORT AND PHLOX FAMILIES

THE Toothworts are attractive spring flowers belonging to the Mustard Family (*Cruciferæ*), which are often found growing abundantly in cool, damp woods. The perennial rootstocks have a peppery taste, which has given the plants the general name Pepper-root. In the Cut-leaved Toothwort the flowers vary from white to pink, while in the Two-leaved Toothwort they are white.

The May Apple or Wild Mandrake is known to everyone throughout its range, although it is not so generally known that the curious plant belongs to the Barberry family (*Berberidaceæ*). The interesting umbrella-like leaves of the plant at once distinguish it, as does also the good-sized white flower nodding from the fork between the leaves. The blossom seems to be devoid of nectar and is seldom visited by insects.

SPIDERWORT. In New England and some other regions that have long been occupied by the white man clumps of Spiderwort along the roadsides often mark the site of an old building whose former presence is shown only in the ruins of a

deserted cellar and plants like this that have escaped from the garden where they once received tender care. There is always something pathetic in these strays from old gardens. They touch our human sympathies and stir the ties of friend-

MOSS PINK

ship in a way that none of the native flowers can do unless they have been grown in this way. But in itself and apart from its associations the Spiderwort is a curious and interesting plant. In the central states and some of the southern states it is a native species, growing in rich woods where

its blue flowers in the axils of the long leaves are very pretty. It is a typical representative of the Spiderwort family (*Commelinaceæ*).

Moss Pink. The Moss Pink is a pretty little blossom belonging to the Phlox Family (*Polemoniaceæ*), that grows naturally on rocky hillsides from New York to Florida and has escaped from cultivation over a much wider area. In New England one is likely to find it wherever there is an old neglected cemetery, from which it often wanders to the adjacent fields and woods. This is really a Dwarf Phlox, as a comparison of the flower with the garden Phloxes will readily show. Its brilliant pink blossoms make a very welcome addition to the colors of the spring landscape.

Sometimes the Moss Pink escapes from its place and becomes a wayside weed. But it is not likely to become troublesome in cultivated fields because it is readily killed when the ground is plowed.

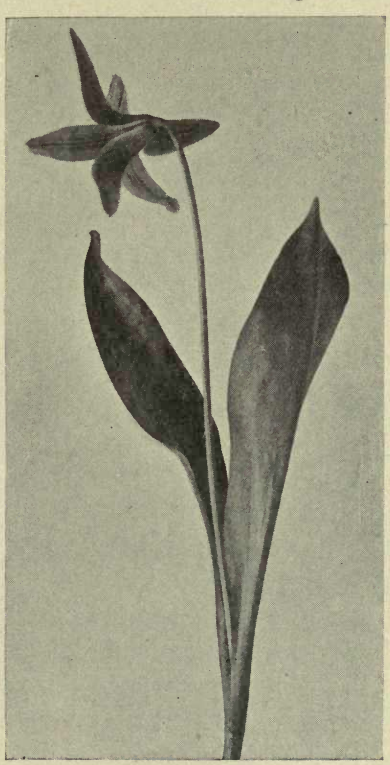
LILY FAMILY

LILIACEÆ

Few families of wild flowers are more distinctive or more beautiful than that of the Lilies. The conspicuous blossoms consist of three sepals and three petals which are frequently similar in structure and appearance and which, taken together, are called the perianth. Within these six parts of the perianth there are generally six stamens and a single central pistil, with three divisions of the ovary and three lobes of the stigma. The plant arises from a bulb and commonly has a single erect stem along which in the typical lilies are sessile alternate leaves. The filament is commonly attached to the anther at the middle of the latter, a condition in which the attachment of the anther is said to be versatile.

Dog's-tooth Violet. The word that is most expressive of the character of the Yellow Trout Lily or Dog's-tooth Violet is grace. In few plants are the simple lines of a graceful picture so well shown as in this: from the grassy bank there rises a cylindrical stem which on each side gradually enlarges into a thickened leaf with smooth margins, rounded and lovely surfaces and a tip that is neither too pointed nor too obtuse.

From between the bases of the leaf rises the slender stem of the flower, showing the slight and



DOG'S-TOOTH VIOLET

inimitable curves of a living thing and arching near the end to hold the bell-like blossom, which is in itself a marvel of pensile grace. In the middle of the latter the stamens and pistils hang

downward, the stamens near the petals and the pistil projecting straight out from the center, appearing as a prolongation of the blossom stem.

The plant as a whole is a charming example of that harmonious asymmetry dear to the art of the Japanese. The colors also are in harmony with the simple outline of the plant: the leaves are of varying shades of green, mottled with rather indistinct markings of a dull whitish color or of a faint purplish hue, while the blossom is a lovely yellow, having occasionally a purplish tinge.

The Dog's-tooth Violet, often called also the Adder's Tongue, is one of our earliest flowers, appearing in April and lasting well into May. From the situations where it is most commonly found one would think that it loved the music of the little rivers, lingering near to listen to the gladsome songs of these "in the season of their prosperity." But it also habitually occurs in open groves and even along the borders of the forest. In rainy weather and at night the flowers close, but they open again upon the appearance of sunshine and are said to turn on their stalks to follow the sun. The blossoms are freely visited by many bees, by which cross-pollination seems to be very generally brought about.

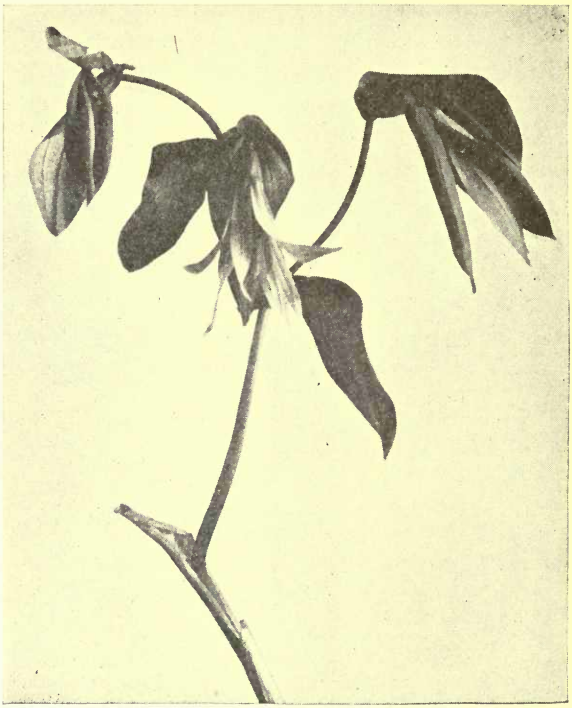
In the western states the White Adder's Tongue is found. This plant bears a general resemblance to the yellow species but it has much

longer lobes of the stigma. The blossoms sometimes vary from white to blue or purple.

BELLWORTS. The Bellworts are very generally classified with the Lily family, although some recent authors have placed them next to this family in the Bunchflower family. Three species of Bellworts are commonly found in the northern and eastern states. In general appearance when growing they resemble one another, although they may easily be distinguished by the leaves. In two species—the Perfoliate Bellwort and the Large-flowered Bellwort—the stems run through the leaves near the base while in the third—the Sessile-leaved Bellwort—the leaves are simply sessile. Of the two first named the Large-flowered Bellwort can generally be distinguished by the size of its leaves and blossoms, which, on the average, are nearly twice as

SESSILE-LEAVED BELLWORT

large as the Perfoliate species. A surer character, however, is found in the fact that in the former the under surface of the leaves is



LARGE-FLOWERED BELLWORT

pubescent while in the latter it is glabrous or glaucous.

All three of these Bellworts inhabit the same situations: they are lovers of moist and shady

woods. Over a wide range—extending from Canada to Georgia and west beyond the Mississippi—they may be found in bloom about the middle of the spring season. In the latitude of southern New England the height of the flowering season comes early in May.

The structure of the plant in all three species is delicate: the stems are slender, swaying with the slightest breeze; the oval leaves are thin and semi-transparent, bending of their own weight; the flowers droop modestly on fragile stalks, their light yellow tints scarcely serving to render them conspicuous to human eyes, although they are readily found by bumble-bees, which visit them freely. Few plants of similar size are so likely as these to be overlooked by the careless stroller in the May woods. On account of their fragile structure they wilt quickly when picked, another reason why they are not more generally known. But as types of gentle modesty the Bellworts add a peculiar charm to the spring woodlands, serving admirably as a foil to the somewhat flaunting beauty of the Painted Trilliums and other more venturesome plants.

Lilies. July is the month of the lilies—the glorious flowers which so long have served as types of grace, purity and beauty. In all of these the structure is simple, yet there is a decided difference in the appearance of the various sorts. If

we stop to consider the reasons for this difference we see at once that it is due chiefly to two causes —color and position. All of our common lilies are constructed on the same general plan: there are six petal-like divisions which form the

CANADA LILIES

perianth, an equal number of stamens, and a single pistil. The great and striking differences apparent in different sorts of lilies are chiefly due to variations in the color of the blossom and the position in which it is attached to the stem.

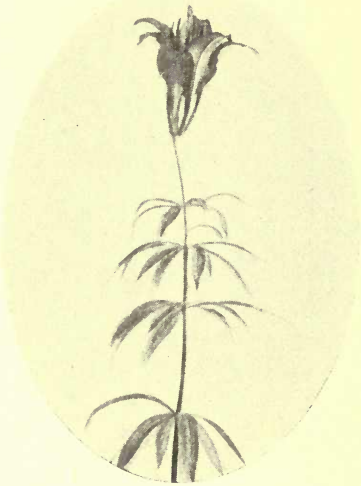
CANADA LILY. One of the most familiar lilies

in the northern states is the Canada Lily or Wild Yellow Lily, the flowers of which are represented on the opposite page. The bell-shaped blossoms hang down nearly vertically, with the pollen-bearing anthers of the stamens in a cluster where the clapper to the bell would be. Just below these anthers and projecting from the middle of them is the stigma on the end of the pistil. The number of blossoms on a plant varies from one or two to ten or twelve. These lilies grow along streams and in meadows where the yellowish red flowers are conspicuous above the grass. Here they are seen by various bees—especially the mason or leaf-cutting bees—which alight upon the stigma and anthers. They collect pollen from the latter, and perhaps they crawl up the filaments of the stamens to reach nectar at the top of the bell. In thus going from blossom to blossom, the bees brush the grains of pollen upon the stigmas of new flowers and cross-pollination is brought about.

These lilies blossom in midsummer when the bees are most abundant; they are chiefly found in open sunny places, such as the bees frequent; and they are of a color easily seen by daylight. In each of these ways they are well adapted to cater to the bees that pollenize them.

The Canada Lily is a widely distributed species, ranging from Nova Scotia and Minnesota in the north to Georgia and Missouri in the south.

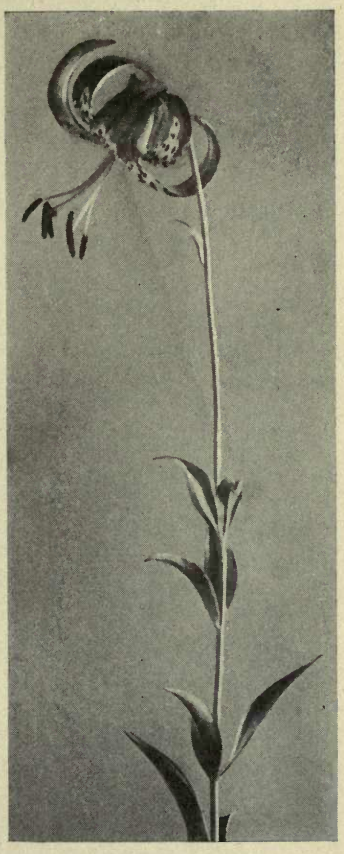
Wood Lily. Entirely different in appearance is the more reddish Wood Lily or Philadelphia Lily in which the flower is held straight up, and so loses the graceful curves that add so much attractiveness to the species with supended blossoms. This seems to prefer drier situations than



WOOD LILY

the Canada Lily, and is found also in more restricted regions, its range being given by the latest authorities as " Maine to Ontario, south to North Carolina and west to Virginia." The petals are generally of a bright red color, being narrowed below so that each flower appears open at the base. The stamens and petals are of about the

same length, and project upward in the middle of the blossom. To me this species is most attractive when there is but one blossom on a stalk, as in the picture opposite, but plants with two, three or even four flowers are not uncommon.



TURK'S CAP LILY

TURK'S-CAP LILY. There are various other species of wild lilies often to be found. The beautiful Turk's-cap Lily of our meadows and marshes is one of the most attractive of these. It is distinguished by its recurved petals of an orange-yellow color —especially toward the ends, with numerous tawny spots upon the front surface. The anthers hang downward, though not always in a vertical position, and the stigma does not project beyond

them. I should think that the flower would be pollenized by bees similar to those which pollenize the yellow Canada Lily.

In the West there is a Red Lily quite similar to the Philadelphia Lily in appearance, while in the South there is still another similar species. The Carolina Lily is an attractive flower found in dry woods in the southern states.

In the older settled regions of the United States the Tiger Lily is not uncommon as an escape from cultivation. It usually marks the site of a ruined or deserted homestead. The magnificent flowers are always attractive and add greatly to the roadside scenery.

> To gild refined gold, to paint the Lily,
> To throw a perfume on the Violet,
> To smooth the ice, or add another hue
> Unto the rainbow, or with taper-light
> To seek the beauteous eye of heaven to garnish
> Is wasteful and ridiculous excess.
>
> *Shakespeare.*

OBSERVATIONS FOR NOTEBOOK

Dog's-tooth Violet:

(*A*) 1. How early have you found the flowers in blossom?
2. Where do you find it growing?
3. Have you ever seen patches of the leaves in places where there were no blossoms?
4. How do you account for such a condition?

5. What insects visit the flowers?
6. How are wingless visitors prevented from stealing nectar?
7. Do the petals remain widely open at night and in cloudy weather?

(*B*) Write for your wild flower booklet a description of the Dog's-tooth Violet, and mention the trees that you have seen coming into leaf while the plant is in blossom.

(*C*) Make a careful drawing of the plant as a whole.

BELLWORTS:

(*A*) 1. Which species of Bellworts may be found in blossom in your locality?
2. How early do the flowers appear?
3. What insects visit the blossoms?
4. Do you suppose that ants could get inside the blossoms to steal the nectar?
5. Have you ever seen the curious three-cornered fruit that looks like a beech nut?

(*B*) Write a little essay for your wild flower booklet, choosing, if you wish, this title: Bellworts I Have Seen. Tell which kinds of Bellworts you have seen, where you have seen them, when they blossomed, what insects visit them and how they prevent nectar robbery by ants.

(*C*) Make a careful drawing of the species of Bellwort that is most abundant in your region.

WILD YELLOW LILY:

(*A*) 1. What is the earliest date at which you have found flowers of the Wild Yellow Lily?
2. What insects have you seen visiting the flowers?
3. When bees visit the flowers where do they alight?

4. In so alighting do they help to bring about cross-pollination?
5. Where is the nectar secreted?
6. Have you ever seen the fruit-pods of the Canada Lily?

(*B*) Write a little essay for your wild flower booklet describing stem, leaves and flowers and telling about the relations of the latter to insect visitors.

(*C*) Make a careful drawing of the upper part of a plant bearing two or three flowers, and on another sheet of paper or else in a panel beside the first drawing make a drawing of one each of the sepals, petals, stamens and pistils.

(*D*) Read the account of the Canada Lily on pages 105 to 121 of *Ten New England Blossoms and their Insect Visitors;* also pages 119 to 124 in *Blossom Host and Insect Guests.*

Flushing with tender bloom the pastures wide
My stately lilies one by one have died.

Julia C. R. Dorr.

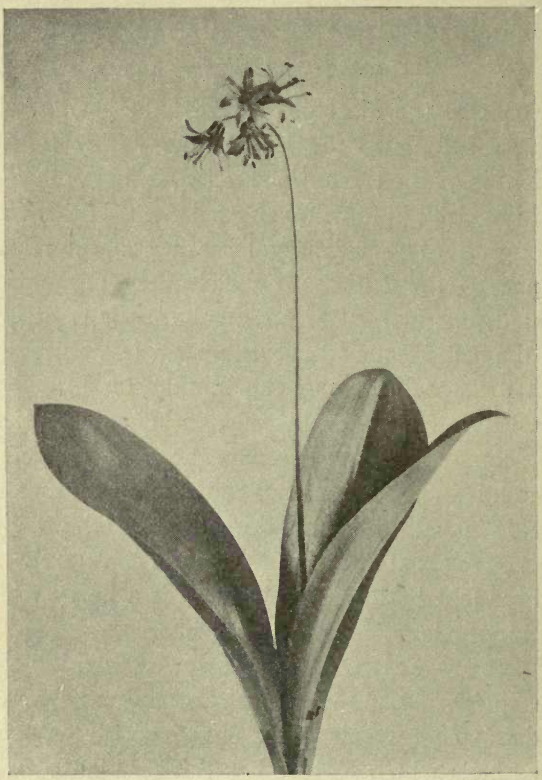
LILY-OF-THE-VALLEY FAMILY

CONVALLARIACEÆ

Some of the most beautiful of the spring wild flowers belong to the Lily-of-the-Valley family, which is named from the Lily-of-the-Valley so highly prized in our flower gardens. The flowers belonging to this family have a general resemblance to the Lilies, to which they are closely related, but instead of having bulbs or corms, as do the Lilies, they have more or less thickened rootstocks which may be simple or branched. The leaves are generally parallel veined and there are commonly three sepals and three petals, although in their appearance these sometimes resemble each other, as do those of the Lilies. There are six stamens and the pistil commonly has a three-lobed stigma. The fruit is a berry which is more or less fleshy in its structure.

Yellow Clintonia. Toward the middle of the spring season you may often come across in damp, cool woods in the Northern States good-sized beds which Nature has thickly planted with the Yellow Clintonia—a member of the Lily-of-the-Valley family that always reminds me of an orchid. I suppose this is because the large, smooth, shiny leaves so closely resemble those of

the Showy Orchis, which is found in bloom on wooded slopes at the same season. Each plant



YELLOW CLINTONIA

sends up from the leaves a single flower stalk which bears the drooping, bell-like blossoms. These flowers are freely visited by such bees as

penetrate the shady vistas where they grow, and the visitors appear to get both nectar and pollen in exchange for their services in carrying the pollen from flower to flower. The species is a northern form, as its technical name, *Clintonia borealis,* indicates: it extends southward as far as North Carolina and Wisconsin.

The White Clintonia is a less widely distributed species, with smaller erect flowers and black berries, which is found as far north as New Jersey and New York and as far south as Georgia and Tennessee. It blossoms during May and June and commonly has more flowers upon a single central stalk than does the Yellow Clintonia.

False Solomon's Seal. The Wild Spikenard or False Solomon's Seal differs strikingly in appearance from the true Solomon's Seal. It has a conspicuous panicle of many small white blossoms on the end of the main stalk beyond the leaves. It grows in the same shrubby thickets or woodland borders where the Solomon's Seal is found and is distributed over much the same geographical regions. It is pollenized by small bees that gather some of the abundant pollen. This is a widely distributed species, extending over practically the whole of eastern North America.

The Star-flowered Solomon's Seal is a somewhat similar plant which in some of the eastern

states is found in great abundance along the borders of woods and along the embankments of railways. It is distinguished from the Wild Spikenard by the fact that the flowers are

FALSE SOLOMON'S SEAL

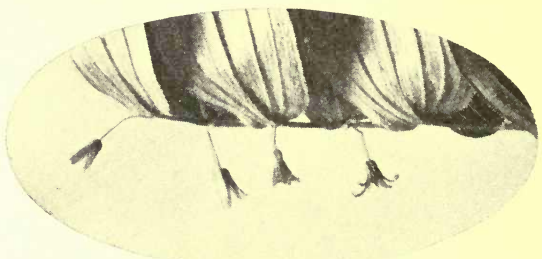
arranged along a central stalk in the form of a raceme rather than on many stalks in the form of a panicle. The flowers are not so numerous but individually they are somewhat larger. They blossom in May and June and frequently occur in

thick beds of considerable beauty. The plants reach a height of ten to twenty inches, each stalk bearing numerous sessile and slightly clasping leaves.

WILD LILY-OF-THE-VALLEY

WILD LILY-OF-THE-VALLEY. The Wild Lily-of-the-Valley is a beautiful little plant with two or three broad and shining leaves and many small, fragrant, pure white flowers above them on the central stalk. Each tiny flower consists

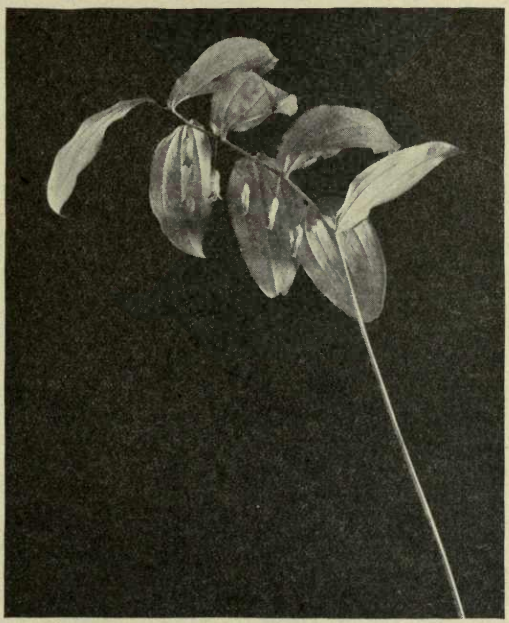
of the perianth—or the petal-like part—with four lobes, four stamens and one pistil, the stigma of the latter being two-lobed. After the flowers have passed the pretty pale red berries ripen. The plant grows abundantly in sparse woods—especially pine woods—and is found in the north from Newfoundland to the Northwest Territory, extending southward to North Carolina and South Dakota. This flower is sometimes called the Two-leaved Solomon's Seal and occasionally the Canada Mayflower.



FLOWERS OF TWISTED-STALK

TWISTED-STALK. The Twisted-stalk or Streptopus is one of the most interesting of the early summer wild flowers. There are two species of these plants, one with leaves that completely clasp the main stem at their base, which is called the Clasping-leaved Twisted-stalk, and the other with leaves which are simply sessile, which is called the Sessile-leaved Twisted-stalk. The flowers of the former are greenish white while

those of the latter are rosy or rosy purple. In both species they are rather small and of a bell-like form, hanging downward from rather short stalks. In both the fruit is a round or oval red berry about half an inch in longest diameter.



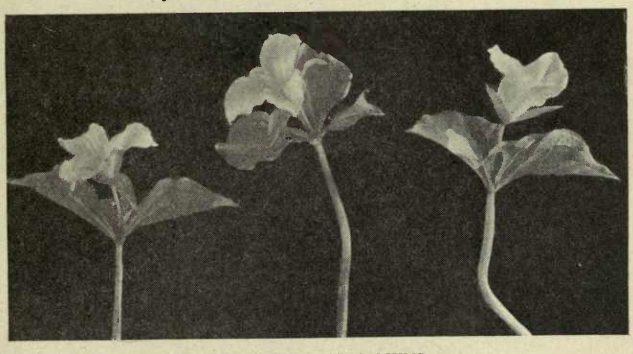
SOLOMON'S SEAL

SOLOMON'S SEAL. There are also two species of the curious plant known as the Solomon's Seal, both of which are widely distributed in the eastern region of North America. One is called the Hairy Solomon's Seal on account of the pubes-

cence on the under side of the leaves, while the other is called the Smooth Solomon's Seal on account of the absence of such pubescence. The flowers of the two kinds are quite similar, being rather small greenish or greenish white blossoms which commonly hang in pairs from drooping stalks. To us these blossoms seem neither particularly beautiful in color nor attractive in odor, but many insects, especially small bees, visit them freely and carry the pollen from blossom to blossom. The common name of these plants is due to the curiously thickened rootstock which has interesting scars upon its surface that doubtless suggested its name. The plant comes into bloom about the middle of the spring season and continues in blossom for some time.

CUCUMBER-ROOT. The Indian Cucumber-root is a curious plant which one would hesitate to put in the same family with the Lily-of-the-Valley. In its habit of growth it is very different from the garden flower, the erect plant commonly reaching a height of two or more feet and having its parallel-veined leaves arranged in whorls around the central stalk. Above the upper whorl of leaves the flowers are borne in a curious umbel, being held nearly erect upon slender pedicels. The plant is found in blossom in early summer in moist woods and ranges from Nova Scotia west to Minnesota and south to Tennessee and Florida.

TRILLIUMS. One of the best known groups of the Lily-of-the-Valley family is that of the Trilliums or Wakerobins. In their plan of structure these are very similar to one another. A thick stem rises straight out of the soil, tapering gradually toward the top. At some distance from the ground it sends off at right angles three broadly oval leaves, which may or may not



LARGE WHITE TRILLIUMS

have short stalks and which vary somewhat in their outline. Above the leaves is a single flower; in a few species there is no flower-stalk, the blossom nestling upon the leaves, but in most sorts there is such a stalk.

Seven species of Trilliums are commonly listed as growing in the eastern region of North America. Of these the first to blossom in the spring is the beautiful little Snowy Trillium or Early Wakerobin, which is one of the most inter-

esting of all the early spring wild flowers. It is not a very widely distributed species, being found from " Pennsylvania to Ohio, south to Kentucky and Iowa." Within these limits, however, it is decidedly local, occurring only here and there in woods and along river banks. In appearance it seems much like a miniature reproduction of the common Large-flowered Wakerobin, from which it differs chiefly in its smaller size and in the presence of petioles upon its leaves. The plant rarely reaches a height of more than six inches. The petals are pure white; the blossom has a short stalk; the fruit is a three-lobed roundish berry. In Ohio I have found it blossoming in March, when it well deserved its Latin name, *Trillium nivale*—the Snowy Trillium—for it was in bloom before the snow had disappeared.

White Trillium. In my boyhood days in central Michigan the White Trillium or Large-flowered Wakerobin was the wild flower of May. The woods were full of the beautiful blossoms which we all loved to gather and to bring home, where they retained their freshness for several days. Since then, while living in other states where this flower does not grow, the name Wakerobin always carries me back to those Beech woods and it is only by an afterthought that I can connect the name with the other Trilliums to which it is applied.

In the White Trillium the flower-stalk is from one to two inches long. The flower consists of three green, sharply pointed sepals, three large white petals, six stamens with greenish white filaments and yellow anthers, and a central pistil having three well developed stigmas. The petals

PAINTED TRILLIUM

are quite long, so that the flower is deeper and more bell-like than those of the other species of the genus. Like the other Trilliums this one is a lover of rich moist woods. It ranges as far north as Quebec and Minnesota and as far south as Florida and Missouri. It seems to be seldom found in the more eastern states.

Painted Trillium. Throughout its range the Painted Trillium often takes the place of the large White Wakerobin in the May woods. It delights in moist shady situations, where in many regions it is found in great abundance. It is a very bright blossom and one of the most conspicuous of the spring wild flowers. The white petals stand out from the background of green leaves and are made more striking by the blotches of brilliant crimson painted in a large V-shaped spot at the base of each petal. No other flower in its situation is so likely to catch the eye of the stroller through the woods. In New England it is one of the most characteristic of the May wild flowers, although in some regions it is rare or only locally abundant. It is also found in the north from Nova Scotia to Wisconsin and in the south from Georgia to Missouri,—a wide range, but one in which the species is by no means generally distributed. During much botanizing in Michigan and Ohio I never saw the flower.

Birthroot. The Birthroot or Ill-scented Trillium, which is often called the Purple Trillium, resembles the Large-flowered Trillium in its leaves and flower-stalks but differs strikingly in the blossom, which is flat and shallow like that of the Painted Trillium. In the Northeastern States the petals are generally of a deep maroon color, often becoming redder as they wither, but in Ohio

the petals are commonly white. This variation is a remarkable one; were it not for the gradations to be found between the two colors the plants bearing each would be likely to be considered as a distinct species.

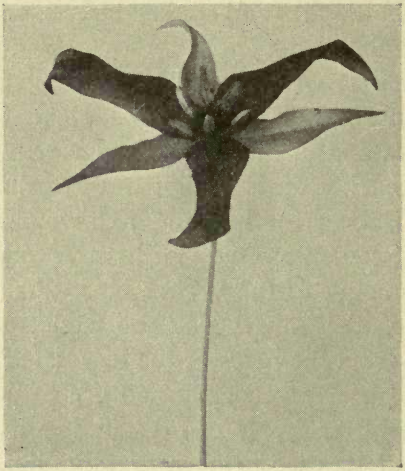
The reddish color and peculiar disagreeable odor are believed to be for the purpose of attracting bluebottle flies and similar insects, which feed upon the dull yellow pollen.

The Birthroot is a widely distributed species. In the north it is found from Nova Scotia to Manitoba and in the south from North Carolina to Missouri. It is common throughout New England, occurring in damp, rich woods.

The Sessile-flowered Trillium is one of the least attractive of the Wakerobins. As the name indicates, the flower has no stalk, springing directly from the bases of the leaves. The petals stand up nearly vertically and are of a purplish or greenish color. Notwithstanding its appearance the flower has a rather pleasant odor. In the east the species is not distributed very far north, being found from Pennsylvania to Florida and extending west to Minnesota and Mississippi.

The interesting Nodding Wakerobin is distributed in woods from Nova Scotia to Minnesota and south to Missouri and Georgia. It bears a somewhat general resemblance to the Ill-scented Wakerobin, with which it is sometimes confused

and from which it may be known by the shorter flower-stalk, which turns down beneath the leaves and the white or pinkish petals, which are recurved. The Prairie Wakerobin is a species in which the flower is sessile and the leaves have rather long petioles. It is found in a limited region in the Mississippi Valley.



PURPLE TRILLIUM

One may often find in the older settled regions of the United States two familiar members of the Lily-of-the-Valley family which have escaped from cultivation. One of these is the common Asparagus of the garden, which is frequently found growing in waste places, where perhaps some seed has been dropped by a bird or carried

in some other way, while in the vicinity of deserted homesteads it is not uncommon to find some Lilies-of-the-Valley bravely struggling to keep alive in a contest with the weeds and grass. Neither of the plants, however, are likely to become so abundant that we would generally recognize them as belonging to our wild flora.

OBSERVATIONS FOR NOTEBOOK

YELLOW CLINTONIA:

(*A*) 1. Where have you seen the Yellow Clintonia growing?
2. Were the plants widely separated or grouped together in colonies?
3. When do they blossom?
4. What variations are there in the number of flowers upon a stalk?
5. What insects can you find visiting the blossoms?
6. Where is nectar secreted?
7. How are ants excluded?
8. Have you ever seen the fruits?

(*B*) Write a description of the Yellow Clintonia and illustrate it by a careful drawing of leaves and flowers.

(*C*) Read Chapter III of *According to Season.*

WILD SPIKENARD:

(*A*) 1. Where have you seen the plant growing?
2. Is there much variation in the size of different plants?

3. What is the color of the stamens and pollen?
4. Have you seen any insects visiting the flowers?
5. Is there any nectar present?
6. Have the blossoms any odor?
7. What sort of a root has the plant?
8. Why should it be called False Solomon's Seal?

(*B*) Write a short description of the Spikenard and illustrate it by a drawing of the whole plant.

WILD LILY-OF-THE-VALLEY:

(*A*) 1. In what sorts of situations does the Wild Lily-of-the-Valley grow most abundantly?
2. When do the blossoms appear?
3. Have you ever seen any insects visiting the flowers?
4. Can you find any nectar?
5. Is there any odor?
6. Can you distinguish through the lens the four lobes of the perianth, the four stamens and the one pistil?
7. What is the color of the pollen?
8. Have you ever seen the red berries later in the season?

(*B*) Write a little essay concerning the Wild Lily-of-the-valley, following some such outline as this:

Where it grows.
When it blossoms.
How it looks.
Stem.
Leaves.
Flowers.

(*C*) Make a careful drawing, with a sharp lead pencil, of the whole plant.

SOLOMON'S SEAL:

(*A*) 1. Do the plants in your locality belong to the species called the Hairy Solomon's Seal or that called the Smooth Solomon's Seal?
2. What kind of a root has the plant?
3. Can you see anything about the root to account for the name of the species?
4. What is the color of the blossoms?
5. Is there any nectar in them?
6. Have you seen any insects visiting them?
7. How are ants excluded from the inside of the flower?

(*B*) Write a description of the Solomon's Seal for your wild flower booklet and illustrate it by careful drawings of the root, stem, leaves and blossoms.

TRILLIUMS OR WAKEROBINS:

(*A*) 1. What species of Trilliums can you find in your locality?
2. In what sorts of situations do they grow?
3. Do they all come into blossom at the same time?
4. In the case of the commonest species answer the following questions:
    1. How does this Trillium prevent self-pollination?
    2. How does it bring about cross-pollination?
    3. Has it nectar?
    4. What sort of a root system has it?

(*B*) Write an essay for your wild flower booklet, with this title: Trilliums I Have Known. Describe the distinctive characteristics of each kind you know and tell where it is found.

(*C*) Make a sketch of two or three different species of Trilliums, and in the case of one species make a careful drawing of one each of the sepals, petals, stamens and pistil.

(*D*) Read the account of the Purple Trillium on pages 53 to 60 of *Ten New England Blossoms and their Insect Visitors.*

MADDER FAMILY

RUBIACEÆ

THE Madder family is a comparatively small group which includes a few herbaceous wild flowers common in the United States. These have small leaves which are arranged either opposite each other or in whorls around the stalk. In most cases the flowers are of two or three forms as regards the lengths of the stamens and pistils. The calyx tube is attached to the ovary and the petals are united to form the corolla.

BLUETS. The familiar Bluets, or Quaker Ladies, are the most abundant of the spring wild flowers that belong to this family. These blossoms are especially well known by the people in New England and the eastern region of the United States. Although the plant has a rather wide range, being found in the east from Nova Scotia to Georgia and extending westward as far as Michigan, it seems to be the most general and abundant in New England, where, in almost any locality, hillsides may be found tinted with it in May. The species is now called by many common names, although early in the nineteenth century it apparently had no such names. In his *Plants of Boston,* pub-

lished in 1824, Professor Bigelow wrote of it as the Bluish Houstonia, evidently a translation of its botanical name. In 1827 Professor Nuttall wrote that he knew of no "common prevailing name"

Photograph by A. H. Verrill

BLUETS

for it. A little later it was called by some of the botanists "Venus' Pride," scarcely a happy term for so demure a blossom. The flowers seem to have been first called Quaker Bonnets in Pennsylvania, and the name has since been corrupted to

Quaker Ladies. Innocence is a charming and appropriate name but I can see no reason why the plant should ever have been called the Dwarf Pink or American Daisy, though the sweetness of its delicate perfume is well suggested by the name "Baby's Breath."

The Bluets are of as much interest to the botanist as to the lover of beautiful landscapes, for this is a dimorphous or two-formed flower: in one form the style of the pistil is long, bringing the stigma to the mouth of the corolla while the stamens are inserted towards the base of the tube; in the other form the pistil is short while the stamens are inserted near the mouth of the tube. The first is called the long-styled blossom and the second the short-styled.

Nectar is secreted in the base of the flower cup and the blossoms are freely visited by small bees and butterflies: cross-pollination is brought about by these visits because the pollen from the short-styled flower is carried to the stigma of the long-styled flower, while the pollen from the long-styled flower is carried to the stigma of the short-styled one. An examination of the stigmas of the short-styled flowers will show how this happens.

The Bluets are very sensitive to atmospheric conditions. At night and in rainy weather the blossoms turn down, to become erect again when sunshine appears.

To find the pure white blossoms of the Partridge Vine or Twin-berry you must seek the shade of the pine woods early in June, where the brown carpet of fallen needles is variegated with the dark green, oval leaves of this plant. The flowers are always borne in pairs, each terminating a short branch. Later they give place to the curious double fruits which, when red and ripe, give the plant its common name. The flowers are tubular, with four flaring petal lobes. On the front of these, as well as inside the tube, are numerous fine white hairs, making a thicket that effectually prevents any wandering ant from crawling down the tube and stealing the nectar, which is thus reserved for the bees that bring about cross-pollination. This is insured by the fact that in some flowers the stigma projects in the mouth of the corolla and the stamens are low, while in others this condition is reversed.

PARTRIDGE VINE

OBSERVATIONS FOR NOTEBOOK

BLUETS:

(*A*) 1. In what sorts of situations are the first Bluet flowers to be found?

2. How does their time of appearance compare with that of the Hepatica, Dog's-tooth Violet and Mayflower?

3. Have the blossoms any odor?

4. Is the corolla tube, as seen from the side, of the same shape in all flowers?

5. If you find a variation in the shape of this tube see if the stamens and pistils in the two kinds of blossoms differ in any way.

6. What insects visit the flowers?

7. Where is the nectar secreted?

8. How does the plant prevent ants from stealing the nectar?

9. Are there hairs on the outside or inside of the flower?

10. Why do you sometimes see the blossoms turned down on their stems and at other times turned upward?

11. Do the same flowers thus change their position?

12. What variation do you find in the colors of the flowers?

13. What sort of seed pods do the Bluets develop?

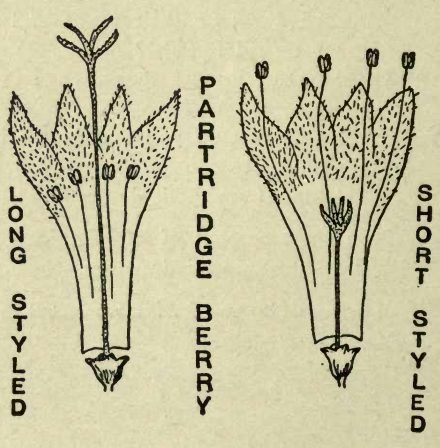
(*B*) Write a short account of The Pollination of the Bluets. Illustrate by drawings.

(*C*) Read pages 61 to 66 of *Blossom Hosts and Insect Guests.*

PARTRIDGE VINE:

(*A*) 1. Why is this plant called the Partridge Vine?
2. Why it is sometimes called the Twin Berry?
3. Are the flowers always borne in pairs?
4. Do you find flowers which show the extraordinary variations in the length and position of stamens and pistil?
5. Where is nectar secreted?
6. How is the robbery of this nectar by ants prevented?
7. In what sorts of situations are Partridge Vines most abundant?
8. Do the berries ripen and go by in a short time, as does the fruit of the strawberry, raspberry and blackberry?
9. What is the arrangement of the leaves on the stems of the Partridge Vine?
10. Do these leaves ever make a mosaic on the ground beneath the pine trees?

(*B*) Write a description of the Partridge Vine, its blossoms and fruit, and illustrate it by careful drawings.



VIOLET FAMILY

VIOLACEÆ

Everyone is familiar with the leading characteristics of the Violet family. The beautiful irregular flowers with five sepals and five petals, some of the latter being curiously modified into nectar spurs, are succeeded by small capsules within which are the numerous minute seeds. The one important genus of this family widely distributed in eastern America is that of the true Violets—Viola.

May is the month of the Violets. Whether blue, yellow or white these are always beautiful, and they are perhaps more dear to most of us than any of the other wild flowers. Some blossom in April and others continue into June, but the height of the season of these lovely flowers comes in May.

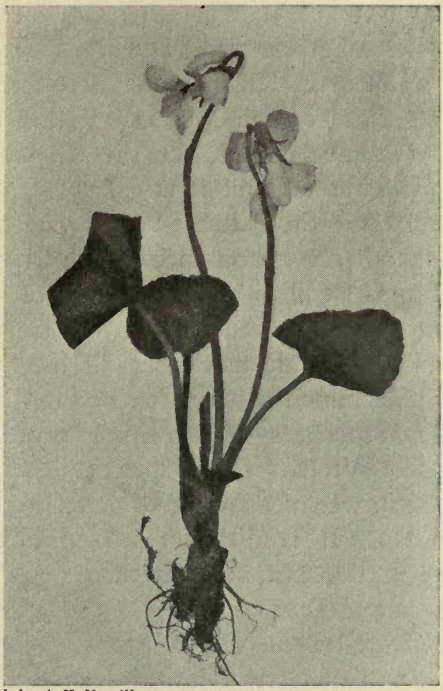
About thirty species of violets are found in the United States. Most of these are widely distributed so that it is almost hopeless to attempt to name without a careful botanical key all the violets one may be able to find in a given region. I can discuss here only a few of the more abundant species.

In classifying violets the first thing to notice

is whether the plant in hand is a stemless or a stemmed species. In the former the leaves and flowers are borne on stalks which all appear to rise from the ground or from rootstocks creeping along the ground. In the latter the leaves and stems arise from branches which extend upward from the crown. One of the next things to notice is the presence or absence of a fringe of hairs on the inside of the petals toward the base: when these are present the Violet is said to be one of the *bearded* species; when they are absent it is a *beardless* species.

Stemless Blue Violets. Of the stemless bearded Violets the Common Blue Violet, frequently called the Meadow Violet and sometimes the Hooded Blue Violet, is perhaps the most abundant. "Royal in color as in lavish profusion," writes Neltje Blanchan, "it blossoms everywhere—in woods, waysides, meadows and marshes, but always in finer form in cool shady dells; with longer flowering scapes in meadow bogs; and with leaves longer than wide in swampy woodlands. Beards on the spurred lower petal and the two side petals give the bees a foothold when they turn head downward, as some must, to suck nectar. This attitude enables them to receive the pollen dusted on their abdomens when they jar the flower at a point nearest their pollen-collecting hairs. It is also an economical advan-

tage to the flower, which can sift the pollen downward on the bee instead of exposing it to pollen-eating interlopers. Among the latter may be classed the bumble-bees and butterflies, whose



Photograph by A. H. Verrill

BLUE VIOLET

long tongues pilfer *ad libitum*. 'For the proper visitors to the bearded Violets,' says Mr. Robertson, 'we must look to the small bees, among which the Osmias are the most important.'"

The Early Blue Violet is another stemless bearded species. It is more likely to be found in the comparatively dry soil of woods than in open meadows. It is distributed from Maine to Georgia in the east, and extends westward to Minnesota and Arkansas. The first spring leaves of this Violet are likely to be heart-shaped, resembling those of the Meadow Violet, but the later leaves have the margins divided into many lobes. On this account it is called by botanists *Viola palmata*—the Palmate-leaved Violet.

Still another common species which comes in the group of stemless bearded Blue Violets is the abundant Arrow-leaved Violet. This is easily distinguished by the arrow-shaped leaves which give it its common name as well as its botanical one—*Viola sagittata*—which simply says in Latin Arrow-like Violet. This species is especially abundant in wet meadows and along the borders of marshes. It is distributed from Maine to Georgia in the east, and extends westward to Minnesota and Texas.

The Ovate-leaved Violet bears a general resemblance to the Arrow-leaved sort, except that its leaves are ovate rather than distinctly arrow-shaped. It grows in drier soil than does the other and has shorter petioles, the flower-stalks being as long as the leaf and its petiole.

We come now to a beautiful stemless blue Vio-

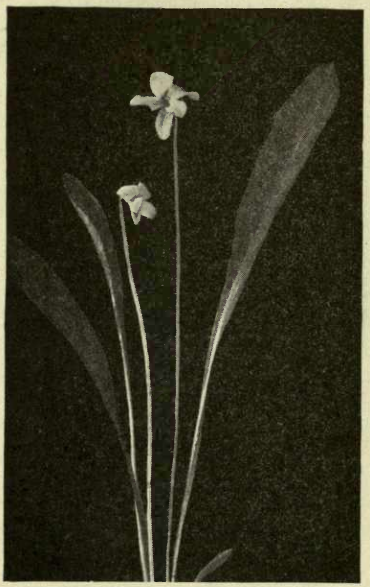
let in which the petals are not bearded at the base—the Bird's-foot Violet. The leaves are divided into many narrow lobes which give a resemblance to a bird's foot, whence the English name as well as the Latin one—*Viola pedata.* This species is so characteristic that it will be at

Photograph by A. H. Verrill

BIRD'S-FOOT VIOLET

once recognized from the picture. The only sorts with which it is likely to be confused are the Coast Violet of the East and the Prairie Violet of the West, but these are both bearded species and are easily distinguished. The Bird's-foot Violet is distributed from Maine to Florida, and Minnesota to Missouri, but it is by no means a

common species in most localities within these boundaries. It is more likely to be found along hillsides or in comparatively dry fields than in marshes and meadows. It has none of the closed flowers that so many of the Violets bear.



LANCE-LEAVED VIOLET

WHITE VIOLETS Two or three species of stemless white Violets are widely distributed in the United States. The Sweet White Violet is a moisture-loving sort, occurring especially in wet meadows, or along brooks, or in swamps. It is abundant over a very wide range, the limits eastward being Newfoundland and North Carolina and westward British Columbia and California. The stems and the heart-shaped or kidney-shaped leaves are generally smooth and shiny, a fact which distinguishes this species from the Kidney-leaved Violet, the stems and

leaves of which are pubescent or hairy. The latter is found in the Northern States.

Another common and widely distributed white violet is the Lance-leaved Violet. It occurs in damp situations in a region whose limits are Nova Scotia and Florida on the east and Minnesota and Texas on the west. It may be known at once by its long, slender, lance-like leaves.

The Primrose-leaved Violet differs from the other white violets in its oval or ovate leaves. It is a lover of moist situations more or less exposed to sunshine. It is an eastern form, occurring from "New Brunswick to Central New York, Florida and Louisiana."

YELLOW VIOLETS. Only one species of stemless yellow violet commonly occurs in our flora: this is the Round-leaved Violet. It is found in open woods as well as on rocky hillsides from Labrador to North Carolina, extending westward to Minnesota.

Passing now to the stemmed violets, in which leaves and blossoms are borne on upright stems, we find one common yellow sort—the Hairy or Downy Yellow Violet. This is a widely distributed species with kidney-shaped leaves, and having both leaves and stems thickly covered with tiny hairs. This fact at once distinguishes it from the Smoothish Yellow Violet which is a less common sort.

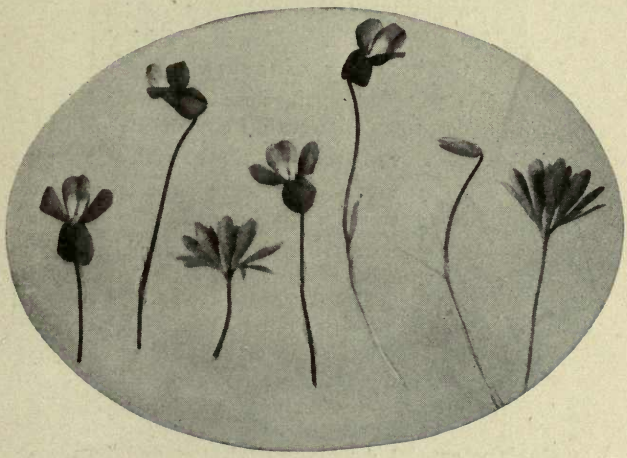
STEMMED BLUE VIOLETS. There are several rather common species of the stemmed blue violets. The Canada Violet is one of the most abundant of these. This is a wood-loving

Photograph by A. H. Verrill

DOWNY YELLOW VIOLET

species, extending southward to North Carolina and New Mexico, but being especially common in the more northern states. It is generally larger and more robust than the American Dog Violet, which is also found abundantly in the

more northern states, especially in moist shaded situations. The Long-spurred Violet is another of the stemmed blue sorts. It is at once distinguished from all other violets by the remarkably long nectar-spur which projects backward from the flowers.



BIRD'S-FOOT VIOLET

OBSERVATIONS FOR NOTEBOOK

VIOLETS:

(*A*) 1. How many species of violets have you found growing in the region of your school?

2. Make a list of them according to color and opposite the name of each mention the sort of situation in which it grows.

3. Make another list of these violets according to whether they are stemmed or stemless species and still another as to whether the flowers are bearded or beardless.
4. What insects have you seen visiting the violet flowers?
5. When bees visit these blossoms how do they alight upon them?
6. Are there nectar guides in any of the violets that are common in your vicinity?
7. Can you find small, closed, more or less underground flowers on any of the plants?
8. What sort of seed-pods do the violets develop?
9. Have you ever seen these pods open explosively to scatter the seeds?
10. Have you ever found any violet blossoms in autumn?

(*B*) Write an account with the title: Violets I Have Seen. Mention some distinguishing characteristics of each species and tell where it grows.

(*C*) Make careful drawings of leaves and flowers of at least three species of violets.

(*D*) Read pages 15 to 18 in *Blossom Hosts and Insect Guests*; also page 28 to 31 in *Nature's Garden.*

(*E*) Copy carefully into your wild flower booklet one or more of the following verses:

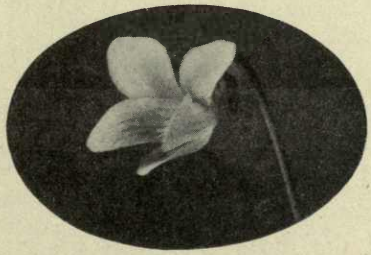
Violets dim,
But sweeter than the lids of Juno's eyes,
Or Cytherea's breath.

Shakespeare.

The violet in her greenwood bower,
Where Birchen boughs with Hazel mingle,
May boast itself the fairest flower
In glen, or copse, or forest dingle.
Sir Walter Scott.

After the slumber of the year,
The woodland violets reappear;
All things revive in field and grove,
And sea and sky; but two which move
And form all others, life and love.
Shelley.

"A Violet by a mossy stone,
Half hidden from the eye."



IRIS FAMILY

IRIDACEÆ

The members of this interesting family are perennial herbs which usually have thickened or bulbous roots, with vertical two-ranked leaves and showy flowers in which the three stamens face outward. While this group includes many of our most beautiful cultivated plants there are comparatively few wild flowers belonging to it. Of these the Wild Iris or Blue Flag is perhaps the most abundant widely distributed species.

Blue Flag. Writing of the common Wild Iris, or Larger Blue Flag, many years ago, the naturalist Thoreau, remarked that it is "loose and coarse" in habit, and also added that it is "too showy and gaudy, like some women's bonnets." Fortunately, however, few flower lovers will agree with this judgment, for to most of us the Blue Flag, as it grows along the borders of the running brooks or in the margins of ponds, is one of the most delightful of wild flowers. It is not so attractive when gathered and used for indoor decoration, as are many others, but the beauty of such a plant is to be judged by the place where Nature puts it.

The flower of the Blue Flag is of especial inter-

PISTIL
STAMEN
STIGMA
BLUE FLAG

est in its structure because it shows a remarkable adaptation to cross-pollination by insects. The style of the pistil is developed into a petal-like expanse, on the under side of which is the stigma. The other parts of the flower are so arranged that when a bee comes for nectar it brushes past the stigma, leaving pollen upon it. Then it receives a new supply of the golden dust to carry to the next blossom that it visits. Bumble-bees are the most frequent of these visitors, but there are also many species of flies and butterflies. If you will watch some of the Iris flowers for half an hour you can see how the bees get the nectar and also how some of the butterflies are able to steal this sweetness without pollenizing the stigma.

Blue-eyed Grass. The Blue-eyed Grass is always a favorite with children as well as with many older people. The small violet-blue blossom has a yellow center which, with the chief color of the petals, makes what the artists call a complementary harmony. The plant is not at all a grass, belonging rather to the interesting Iris family, so that the one who called this Blue-eyed Grass "the little sister of the stately Blue Flag" was right. You can easily see the resemblance in the mode of growth as well as in the structure of the flower. The blossoming period is very short. In cloudy or rainy weather the blossoms remain closed, opening only in the sunshine.

In addition to the common species of Blue-eyed Grass some botanists recognize two others: namely, the Stout Blue-eyed Grass and the Eastern Blue-eyed Grass.

OBSERVATIONS FOR NOTEBOOK

BLUE FLAG:

(*A*) 1. In what situations have you found the Blue Flag growing?

2. How early did the first blossoms appear?

3. Are there any hairs upon the plant?

4. Do you know of any aquatic plant that is provided with hairs?

5. Can you suggest a reason for their absence?

6. How does the structure of the pistil differ from that of most flowers?

7. Of what advantage is it that the stigma is on the outside of the little flap hanging down from the lobe of the style, instead of being on the inside?

8. How does the structure and position of the stigma and anther lead to cross-pollination when bees visit the flowers?

9. What insects have you seen visiting the flowers?

10. Do butterflies get the nectar without coming in contact with either the stigma or the anther?

11. Are there any nectar guides upon the petals?

12. What sort of a fruit pod develops on the Blue Flag after the flowers go by?

(*B*) Write a little essay for your wild flower booklet upon The Pollination of the Blue Flag and illustrate it by such drawings as are desirable to make your description of interest to the reader.

(*C*) If you take up the study of the wild flowers in autumn complete your account of the Blue Flag by a careful drawing of the fruit pods together with a transverse section.

(*D*) Read the account of the Blue Flag on pages 98 to 104 in *Ten New England Blossoms and their Insect Visitors;* also pages 115 to 118 in *Blossom Hosts and Insect Guests.*

GERANIUM FAMILY

GERANIACEÆ

As now restricted by the leading botanists the Geranium family is a small group of which the common Wild Geranium is a typical example. These are herbaceous plants in which the alternate or opposite leaves are almost always provided with stipules and in which the flowers have all the parts regularly arranged. There are usually five sepals and five petals, with five or more stamens and a single pistil in which the ovary commonly has five lobes and the style is tipped with five stigmas.

WILD GERANIUM. The common Wild Geranium or Spotted Crane's-bill is a widely distributed plant, occurring in the East from Newfoundland to Georgia and extending westward beyond the Great Lakes. It is a perennial, sending up stems and leaves from the thickened rootstock early in spring. The magenta-pink flowers begin to appear about the middle of spring and continue until the middle of summer, being most abundant during May. When each blossom first opens the anthers shed the pollen, so that it is practically all gone before the stigmas unfold. If you will examine a few flowers of different ages you can

easily see that this is true, and while you are looking see if you can find any hairs on the inner surface of the petals. Are they so situated as to protect the nectar at the base of the flower from

WILD GERANIUM

being washed away by rain? The presence of such hairs in the Crane's-bill that grows in Germany first led the naturalist, Sprengel, to study the relations of flowers and insects—a subject to which, before his time, no one had given careful attention.

If you find some flowers which have gone by and which are maturing the long seed pods you will readily see why the plant is called the Crane's-bill, and if you touch some of the seed pods that are brown and ripe you will see an interesting way in which a plant may scatter its seeds.

Herb Robert. The Herb Robert or Red Robin is a species of Wild Geranium which is often found in rocky woods throughout the Eastern States. It is an annual or biennial plant, with flowers much smaller than those of the Wild Geranium, and it is not nearly so attractive as a wild flower as is the more common species. In various parts of the country there are also several other species of Crane's-bills, most of which have rather small blossoms. One of the most interesting of these is the Siberian Crane's-bill, which has been introduced from Asia and which is found abundantly in the outskirts of New York City.

OBSERVATIONS FOR NOTEBOOK

Wild Geranium:

(*A*) 1. Does the Wild Geranium grow most abundantly in the woods or in the fields?
2. What sort of a root system has it?
3. How early have you found the blossoms?
4. How may sepals are there?
5. How many petals?
6. How many stamens?

7. How many lobes of the stigma
8. When the flowers first open are the lobes of the stigma expanded?
9. What is the position of the stamens when the flowers first open?
10. Can you find any nectar in the blossoms?
11. Where is it situated?
12. What is the use of the hairs along the margins of the petals?
13. What sort of a seed pod has the Wild Geranium?
14. How many cavities in the pod?
15. How is the seed scattered?

(*B*) Write a little essay for your wild flower booklet entitled The Pollination of the Wild Geranium. Describe:

The way in which cross-pollination is brought about.

The way in which self-pollination is prevented.

The way in which nectar robbery by ants is prevented.

(*C*) Make a careful drawing of the Wild Geranium and in a panel beside the stem of the plant draw one each of the sepals, petals, stamens and pistil.

(*D*) Read pages 105 to 106 in *Nature's Garden.*

BIRTHWORT FAMILY

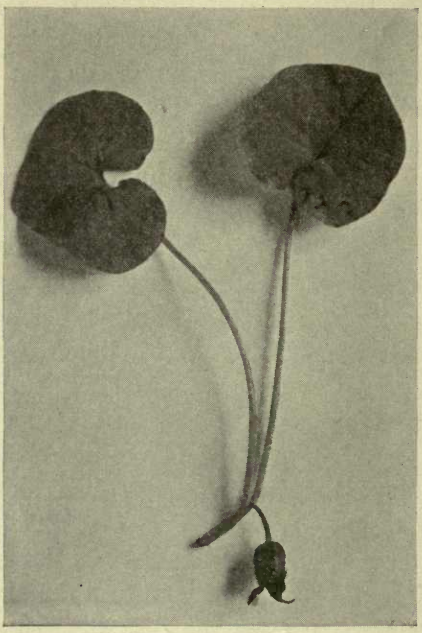
ARISTOLOCHIACEÆ

The curious flowers of the plants of this family have no petals but have many seeds that develop in the six-celled ovary. The interesting climbing plant called Pipe Vine or Dutchman's Pipe, which grows wild in the southern states and is very generally planted about porches in the northern states, is the typical illustration of this group.

WILD GINGER. In the north there is but one common herbaceous wild flower belonging to the family. This is the Wild Ginger, which is a curious flower and one that is likely to be overlooked by the careless stroller in the June woods. The large, kidney-shaped leaves are conspicuous enough, but they hide the bell-like blossom at the base of their rather long stems. The flower-stalk is very short, just holding the flower above the surface of the ground. At first the blossom is held upright, but later the stem turns around so as to turn it downward, as shown in the picture.

Notwithstanding its lack of beauty, this blossom is of decided interest to the naturalist, for it is adapted to pollination by flies which seek it out and carry the pollen from one flower to another. "Within the cosy cup," writes Neltje Blanchan,

" one can usually find a contented fly seeking shelter or food. Close to the ground it is warm and less windy. When the cup first opens, only the stigmas are mature and sticky to receive any



WILD GINGER

pollen the visitors may bring on their bodies from other asylums where they have been hiding. These stigmas presently withering, up rise the twelve stamens beside them to dust with pollen the flies coming in search of it. Only one flower

from a root compels cross-fertilizing between flowers of distinct plants to insure the most vigorous seed, as Darwin proved. After fertilization, the cup nods, inverted, and the leathery capsule following after it, bursts irregularly, scattering many seeds."

The typical form of the Wild Ginger is widely distributed in eastern America. Two other species have recently been separated from it. One is the Long-tipped Wild Ginger in which the calyx-lobes are long and slender; the other is the Short-lobed Wild Ginger in which the calyx-lobes are short and triangular. Both of these species are widely distributed as far west as Iowa.

PRIMROSE FAMILY

PRIMULACEÆ

The Primrose family does not occupy so prominent a place among our American wild flowers as it does in England where the beautiful English primroses grow wild in great abundance and are familiar to everyone. With the exception of the Star-flower, the Shooting Star and the Pimpernel, the American members of this family are not especially attractive. The family is characterized by having flowers which are perfect and regular, with as many stamens as there are petals and a single style and stigma.

SHOOTING STAR. The American Cowslip or Shooting Star is an attractive wild flower which is found abundantly in open woods from Pennsylvania southward. The rose-purple or white flowers are pendent from slender stalks which arise from a more robust scape, the flowers usually being ten or more inches from the ground. The blossoms appear late in spring or early in summer.

LOOSESTRIFE. In damp, swampy places one is almost certain to find one or more species of Loosestrife in blossom throughout the summer. The commonest of these is the Yellow Loosestrife which has an abundance of small flowers

with five yellow petals borne in long clusters toward the top of the plant.

This Yellow or Golden Loosestrife has become naturalized from Europe as has also the closely related Spotted Loosestrife and the Creeping Loosestrife or Moneywort—the latter a lover of moist situations. The Whorled or Four-leaved Loosestrife is the most distinctive native species: the four leaves arise in whorls along the main stem.

PIMPERNEL. The Pimpernel or Poor Man's Weather Glass is a plant which is locally well known, being of especial interest on account of the sensitiveness to weather conditions, which causes the petals to close when the sky is beclouded. The flowers are variable in color, being sometimes red, sometimes purple and sometimes white. The plants run over the ground, being often found along the borders of old gardens and in other places where it has escaped from cultivation.

STAR-FLOWER. There is always a sense of satisfaction in using such an appropriate name as that of the Star-flower. It required little imagination on the part of the one who first applied this name to the blossom of Trientalis, for it is a perfect white star that dots here and there the brown carpet beneath the woods. Its grace and beauty are beyond praise: the slender, round,

straight stem rises vertically a few inches before it sends out its platform of long, linear, finely pointed leaves in a whorl, above which the slender pedicels of the one, two, or three flowers continue for about an inch until each is crowned by the star-like flower. A clear cut plant, it seems always sufficient unto itself, and I fancy one is less tempted to gather it than is the case with many other beauties of the wood.

It is a widely distributed species, being found from Labrador to Minnesota in the north and extending southward to Indiana and Virginia. It is especially likely to be found in damp woods, and has an extremely delicate odor.

OBSERVATIONS FOR NOTEBOOK

STAR-FLOWER:

(*A*) 1. Do you consider this an appropriate name for this blossom?
2. How many points are there to the star?
3. Does the number of these points vary in different flowers?
4. How many flowers are there usually on a single plant?
5. Does the number vary?
6. What is the color of the stamens? Of the pollen?
7. Can you detect any odor?
8. How early do the blossoms appear?

(*B*) Write a description of the Star Flower and illustrate it by a careful drawing of the whole plant.

(*C*) Copy the following quotation: "Is there any blossom poised quite so airily above its whorl of lanceolate leaves as the Star-flower?"

Geo. H. Ellwanger.

STAR-FLOWER

MILKWORT FAMILY

POLYGALACEÆ

This is a comparatively small family represented in the eastern United States by the single genus Polygala, which includes a number of more or less abundant wild flowers. Many of these rather closely resemble one another and are somewhat difficult to determine with certainty, but a very few of them are distinctive and widely distributed.

FRINGED POLYGALA. The most important of these is the beautiful little Fringed Polygala, which is widely distributed in Canada and the northern states. John Burroughs has aptly said that a bed of these flowers looks like a flock of rose-colored butterflies resting after flight. But they are not even what the naturalists call "butterfly blossoms," for their structure adapts them to the bees, so they are among the "bee blossoms." Bumble-bees seem to be the most frequent visitors. They alight upon the mass of fringe at the end of the flower and insert their tongues in between the petals to sip the nectar. In doing this they depress the keel of the flower, uncovering the anthers and the stigma and bringing about cross-pollination

in a way that you can easily see if you will examine the flowers carefully.

This Polygala is also of special interest because it has two sorts of blossoms. Besides the large showy flowers which are on the ends of the stems there are small, whitish, inconspicuous ones near

Photograph by A. H. Verrill

FRINGED POLYGALA

the bases of the stems. These are what the botanists call closed blossoms, never developing completely so far as the petals are concerned, yet producing seed in abundance. The species is also sometimes called Flowering Wintergreen.

OBSERVATIONS FOR NOTEBOOK

FRINGED POLYGALA:

(*A*) 1. Where have you seen the Fringed Polygala growing most abundantly?
2. Is it usually found in colonies?
3. In what way does the method of growth of the plant lead to the presence of several in a place?
4. What insects have you seen visiting the flowers?
5. When bee visitors come where do they alight?
6. How do the visits of such bees bring about the cross-pollination of the flowers?
7. How are ants excluded from the inside of the corolla?
8. Have you found any of the closed blossoms?
9. Are these exposed to the sun or covered with fallen leaves or other material?
10. When a plant like this has a closed corolla do you generally find hairs to exclude ants?

(*B*) Make a careful drawing of stem, leaves and blossoms.

(*C*) Read the account of the Fringed Polygala on pages 90 to 98 in *Ten New England Blossoms and their Insect Visitors.*

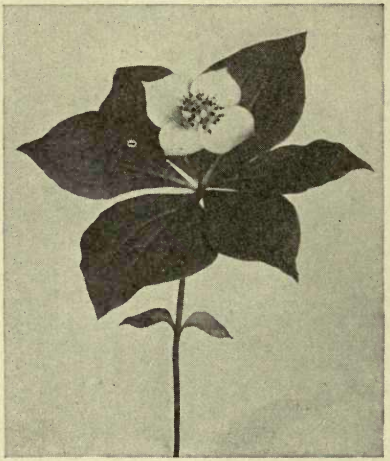
DOGWOOD FAMILY

CORNACEÆ

The Dogwood family is for the most part composed of shrub-like or tree-like species, there being generally distributed in the United States but one herbaceous form. The Flowering Dogwood, a tree with gigantic blossoms and very striking appearance, is a typical representative of this family, the most important characteristic of which, perhaps, is the presence of four large petal-like bracts at the base of the cluster of small flowers. The fruit in all of the Dogwoods is a large or small drupe which has a two-celled stone or pit.

BUNCHBERRY. Of all the carpets of green and white with which the June woods are made beautiful none is more attractive than that of the Dwarf Cornel or Bunchberry. From the latter part of May until the end of June these flowers give a brilliant effect in damp, cool woods throughout a wide geographical range. The single rather strong but slender stem arises from the creeping rootstock to a height of from four to eight inches, before sending out any leaves. Then it sends out six of these in a whorl that makes a horizontal platform surrounding the stem, from the middle of which rises the flower-stalk bearing the good-

sized conspicuous blossom, which, at first glance, appears to be composed of four large white petals. A more careful scrutiny, however, shows that there are complete though tiny flowers above these supposed petals and that what looks like a single blossom really consists of a good many flowers



DWARF CORNEL OR BUNCHBERRY

crowded together in one head. The white petaloid parts, which the botanists call bracts, serve to render the flower-head conspicuous and help to attract short-tongued insects of many kinds to the flowers, their reward being found in the nectar which is secreted around the base of the style. The flowering heads have a delicate odor.

After the white bracts have fallen off each

flower-head develops a group of small berries which structurally are much like little plums and so are called drupes, green at first but later turning to a brilliant red. To these the plant owes its common name of Bunchberry. It seems hard to believe that this delightful little blossom belongs in the same genus as the gigantic Flowering Dogwood, whose great blossoms stand out so conspicuously in the forest. Yet if you compare the flowers of the two you cannot fail to notice how much they resemble each other.

OBSERVATIONS FOR NOTEBOOK

BUNCHBERRY:

(*A*)
1. Where have you seen the Bunchberry growing?
2. Was the situation sunny or shady, wet or dry?
3. How early do the flowers appear?
4. How late in the season may blossoms be found?
5. How does the structure of one of these blossom-heads differ from that of a daisy or sunflower?
6. Have you ever seen any Bunchberry flowers in which the bracts were greenish?
7. What insects visit the flowers?
8. Have you ever seen the red fruit in autumn?
9. In what ways does the structure of one of these fruits resemble that of the common cherry?

(*B*) Write a description of this plant and its blossoms for your wild flower booklet and illustrate it by a careful drawing of stem, leaves and flowers.

(*C*) In September or October study the fruits of the plant and make a drawing of the plant as it now appears, to bind in your booklet next to the drawings of the flower. Read over your description of the latter and recall its appearance as you saw it in June.

(*D*) Read Chapter IV in *According to Season.*

ORCHID FAMILY

ORCHIDACEÆ

The Orchids are perhaps the most interesting of all the flowering plants. They are perennials which are dependent to an extraordinary degree upon insects for the carrying of the pollen from flower to flower. The structure of the blossom is somewhat complicated and it is followed by the curious seed pod in which there is an enormous number of very minute seeds. In nearly all the Orchids there is a labellum or lip which forms, as a rule, the most conspicuous feature of the flower. It is especially striking in the case of our common Ladies'-slippers.

PINK LADY'S-SLIPPER. Of all the wild flowers of June none is more interesting than the Pink Lady's-slipper which over a wide territory in the eastern states is frequently abundant. No matter how often you see it it never becomes commonplace, having to an extraordinary degree the peculiar charm of the aristocratic Orchid family to which it belongs. It seems rather a fitting habitation for elves and fairies than an ordinary denizen of the work-a-day world.

The few other Lady's-slippers to be found in the United States are inhabitants of deep swamps

and secluded woods where very few people ever find them, but this pink species is less exclusive in its choice of an abiding place. In pine woods, in beech and oak woods, in swamps and bogs—

PINK LADY'S-SLIPPERS

these are the places where it grows. On dry uplands or wet lowlands it seems equally at home, the two green leaves appearing above the brown pine needles or the sphagnum moss with equal ease, and bearing between them the stalk tipped with the curious bud that develops into the still

more curious blossom. In this part the petals are developed into a strange pouch-like labellum or lip which gives the flower its chief display. In the top of the labellum is an opening that leads to the large cavity within, the opening being arranged something like those rat-traps in which the rat goes in through an opening in the top through which he cannot return.

The whole curious mechanism of the Lady's-slipper blossom has to do with the visits of small bees which bring about the fertilization of the tiny ovules through the pollen carried from other flowers. The bee enters the opening in the lip and finds itself in the large chamber from which it can only escape through one of two small holes at the upper end of the flower. To reach these the bee walks upward, but before it escapes it must rub its back against the stigma of the blossom, in so doing covering it with any pollen that was upon the bee's back, and then against the anther which is covered with viscid pollen that is smeared upon the back of the bee. Thus it goes to the next flower laden with a new supply of the fertilizing pollen.

You may watch these Lady's-slippers many an hour perhaps without seeing any of the bees at work. But they come occasionally, and the flowers wait patiently, often remaining in good condition nearly a fortnight if no bee arrives.

Sometimes a queen bumble-bee gets into the trap. And for her it is very likely to be a death-trap. The holes beneath the anthers are too

PINK LADY'S-SLIPPERS IN A JAPANESE FLOWER-JAR

small for her to pass through, so that she is likely to be held a prisoner until she dies. Several times I have known flowers to be found with such unfortunate victims inside. One will sometimes

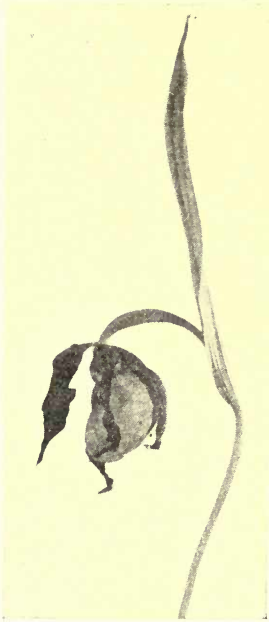
find, though very rarely, one of these Lady's-slippers almost white in color—a strange variation, such as is often found in many other plants.

There is a great temptation to gather these flowers in greater numbers than are needed for any reasonable decoration. A few of them in a simple jar are really more effective than a mass, and there is then a chance for the blossoms to remain in the woods in future years, a joy to all beholders.

SHOWY LADY'S-SLIPPER. While the finding of the Pink Lady's-slippers may readily be an every-day occurrence with the nature-lover in many of the eastern states, a discovery of almost any of the other species marks for most of us a red-letter day. For these other species are becoming more and more rare and are seldom seen even by those who are much in the woods. The beautiful Showy Lady's-slipper is the largest of our native species. It inhabits deep swamps, generally those secluded and remote from human habitation. The single large white blossom is rendered conspicuously beautiful by the wine-red hue which suffuses much of the pouch-like labellum.

YELLOW LADY'S-SLIPPERS. We have two native species of Yellow Lady's-slippers, which both grow in swampy regions and bear a general resemblance to each other, although they differ much in size. One is called the Large

Yellow Lady's-slipper and the other the Small Yellow Lady's-slipper. Both are wonderfully beautiful and have much the same contrivances for effecting cross-pollination that the Moccasin-flower has. Apparently they are chiefly pollenized by small bees.



YELLOW LADY'S-SLIPPER

RAM'S-HEAD LADY'S-SLIPPER. Another Lady's-slipper is the curious Ram's-head species, which is one of the rarest and most interesting of the group. It seems to be less known than any of the others and has been seen in its native haunts by very few people. "I strongly suspect," writes Mr. Baldwin, in his interesting Orchids of New England, "that some elf, having been refused a night's lodging in the cradle of the Pink Lady's-slipper and faring no better on application to a Yellow Lady's-slipper, originated the pert little Ram's-head as a caricature of both."

Other members of the beautiful family of Orchids also bloom in early summer. In bogs

and swamps the slender stems of Pogonia hold erect the graceful pink-red blossoms, while not far away perhaps one may find the magenta-red blossoms of Calopogon with its curiously bearded lip. And in damp woods as well as along the margins of the swamps one may find the lovely flower-stems of the various Fringed Orchids, of which the large Purple-fringed Orchis is one of the most abundant.

Photograph by Dr. H. H. Lamson
FRINGED ORCHIS

LADIES' TRESSES. During August and September the wet meadows often abound with the beautiful white spires of the Nodding Ladies' Tresses, another plant of the Orchid family. Several species are widely distributed east of the Mississippi river, extending north as far as Nova Scotia and south as far as the Mexican Gulf. The leaves are long and

slender, suggestive of blades of grass, while the rather small white flowers are spirally arranged in three rows on the sides toward the upper end of the flower stalk which averages about a foot in height. These flowers are visited by bees, which begin at the bottom of the spiral and work upward. They effect the pollination of the blossoms through one of the curious contrivances for which the Orchid family is famous. The pollen is in a mass which you may see if you will insert the point of a lead pencil into the flower and then withdraw it. The delicate odor of the flowers has been celebrated by Emily Shaw Forman in these lines:

LADIES' TRESSES

Fragrance like thine no rose of June can yield;
No lily can eclipse thy snow, dear prize,
Flung backward from sweet summer as she flies.

OBSERVATIONS FOR NOTEBOOK

PINK LADY'S-SLIPPER:

(*A*) 1. In what situations have you found these plants growing?
2. When do they blossom?
3. Have you ever seen any insects visiting the blossoms?
4. Why would it be a disadvantage to the plant for bees to enter the flower at one of the two holes near the top instead of the larger opening in the middle of the expanded labellum?
5. Have you found any of last year's fruit-pods among this year's blossoms?
6. Why should this be called the Moccasin flower?

(*B*) Write an account of the structure of the Pink Lady's-slipper, showing how it is adapted to cross-pollination by insects.

(*C*) Make a careful drawing of the plant as a whole and also of the seed pods, if the latter are available.

(*D*) Read the account of the pollination of the Lady's-slippers on pages 157 to 166 of *Blossom Hosts and Insect Guests* and on pages 82 to 89 of *Ten New England Blossoms and their Insect Visitors.*

(*E*) Copy these lines into your booklet:

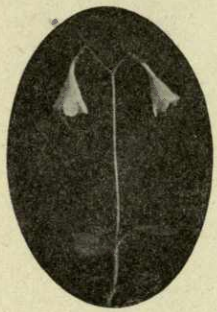
Graceful and tall the slender drooping stem,
With two broad leaves below,
Shapely the flower so lightly poised between,
And warm her rosy glow.

Elaine Goodale.

HONEYSUCKLE FAMILY

CAPRIFOLIACEÆ

TWIN-FLOWER. To the botanist the beautiful little blossoms of the Twin-flower or Linnæa are valued not only for their delicate beauty and delicious fragrance but also because this blossom was chosen to perpetuate the name of the great founder of botanical science—Linnæus, the Swedish naturalist. In its structure the flower is also of decided interest. The inside of the blossom is filled with hairs projecting transversely from the corolla, while the outside of the flower-stalk and the calyx is covered with glandular hairs. Both of these are evidently devices for preventing the visits of ants and other unbidden guests. The stigma projects beyond the stamens, so that cross-fertilization is insured. The flower is probably visited by small bees.



LINNÆA

The Twin-flower is one of the very few herbaceous plants that belong to the great Honeysuckle family, most of the members of which are shrubs. This family includes the numerous species of

Honeysuckle which are found in the United States, as well as the Hobble-bush, Cranberry-tree, Elder and various other well-known shrubs.

The Twin-flower is a northern species, inhabiting cool woods not only in the northern regions of North America but also those of northern Europe and northern Asia. Although the flowers develop into a rounded three-celled fruit, only one of the cells bears a seed. The plants run along the ground in a way suggestive of our familiar Partridge Vine.

—beneath dim aisles in odorous beds,
The slight Linnæa hangs its twin-born heads.
Ralph Waldo Emerson.

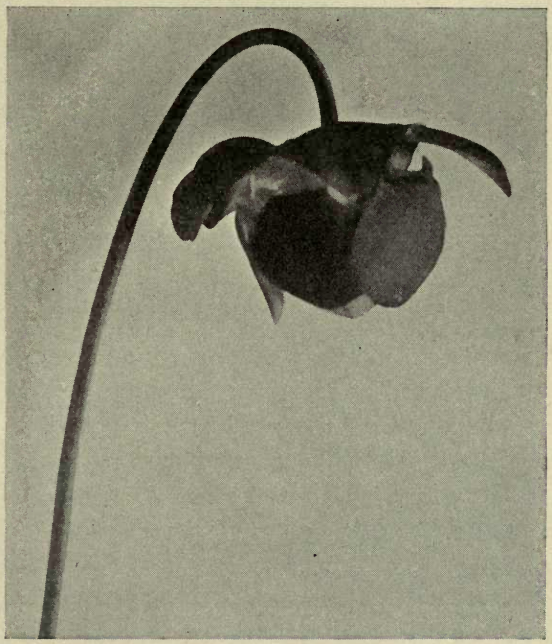
PITCHER PLANT FAMILY

SARRACENIACEÆ

In the more northern states the curious family of Pitcher Plants is represented by but a single species. The members of this group are especially characterized by the modification of the leaves into pitchers that hold water and that serve as traps for various sorts of insects. They also have flowers strange and interesting in structure, although these are not so often seen as are the leaves.

Pitcher Plant. The Sarracenia or Pitcher Plant is one of the most interesting of the plants that blossom in June. To find it you must seek some boggy retreat where the wet carpet of sphagnum moss is made wetter still by the water contained in the pitcher-shaped leaves of this Sarracenia. If you pull up one of the plants you will find that it is anchored in place by a very few scraggly roots that take hold of the surrounding moss, but if you look for rich soil from which plant food may be derived you will see that there is practically none. And when you are led to wonder where the Sarracenia gets the material with which to make its lusty growth you should split open one of the leaves and examine the con-

tents of the pitcher. You will probably find inside a rich *débris* of insect remains among which you can trace the outlines of flies, beetles, and possibly small moths, as well as various other



FLOWER OF PITCHER PLANT

insects. When you see this mass of liquefied organisms you can easily agree with the botanists that the plant probably gets part at least of the materials for growth from these decaying contents.

If now you examine the structure of the leaf you cannot fail to be impressed with its perfection as an insect trap. Throughout most of its length it is a closed tube: at the top it is open but the upper parts of the leaf are well adapted to sending insects to the watery grave below. The whole mouth of the pitcher is thickly covered with spinous hairs that point obliquely downward, so that a fly is likely to find difficulty in crawling upward on them. The leaf is also colored, wherever the veins run, in a purplish red that is believed to be attractive to certain sorts of flies.

In the latitude of southern New England the Pitcher Plants blossom early in June. The flowers are striking objects borne on long stems that turn downward at the top. They are visited by queen bumble-bees that gather pollen and bring about the cross-fertilization of the blossoms. A peat bog with a number of these flowers hanging above the moss is one of the most interesting sights in the world of flowers.

OBSERVATIONS FOR NOTEBOOK

PITCHER PLANT:

(*A*) 1. Have you ever come across pitcher plants growing wild? Where?

2. Were the roots growing in earth or in moss?

3. Is water to be found in the pitchers out of doors?

4. What else does the pitcher contain?
5. Do the hairs on the mouth of the pitcher all point in the same direction?
6. Would it be easy for an insect which had fallen into the water in the pitcher to crawl out again?
7. Have you ever seen the pitcher plant in blossom?
8. Were any bumble-bees visiting the blossoms?
9. Did you find any insects feeding upon the blossoms?
10. Were there any white larvæ living in the liquid which the pitchers contain? If so, they are the larvæ of flies that feed upon the insects caught by the pitchers.

(*B*) Write a short discussion for your wild flower booklet with some such title as one of these: A Vegetable Pitcher and What it Held; Nature's Fly Trap; A Wonderful Leaf; The Pitcher Plant and Its Blossoms.

(*C*) Make these drawings: A Pitcher Plant leaf, side view; A Pitcher Plant flower, side view; A longitudinal section of the leaf, showing the position of the water and the dead insects within the leaf.

JEWEL-WEED FAMILY

BALSAMINACEÆ

JEWEL-WEED. So far as the United States is concerned this is a small family, having the single genus to which our common Wild Balsams or Jewel-weeds belong. These are often called Touch-me-nots, on account of the curious way in which the seed pods burst when disturbed. They are also sometimes called Silver-leaf on account of the beautiful coloring of the leaves. These plants are commonly to be found in damp, shady localities where the soil is rich, being especially abundant along the margins of slow-running streams and ponds and swamps. If you will look at the plants early in the morning, before the sunshine has evaporated the dewy pendants hanging from the margins of the leaves, you will appreciate the significance of the name Jewel-weed; while if you will touch a ripening seed pod you will also appreciate the significance of the name Touch-me-not, or its Latin equivalent Impatiens.

The flowers also are of decided interest, for they appear to be especially adapted to pollination by bumble-bees, although they are freely visited by humming-birds. A little study of

their structure will show how cross-pollination is brought about by either of these visitors. It is easy also to see how perfectly the nectar is protected from unbidden guests by the pendant position of the blossom as well as by the tubular nectary in which it is secreted.

There are two species of these Jewel-weeds—the Fulvous or Spotted Jewel-weed and the Pale Jewel-weed. The latter has the larger flowers and is the more northern form.

OBSERVATIONS FOR NOTEBOOK

JEWEL-WEEDS:

(*A*) 1. Where have you seen Jewel-weeds growing?

2. Are they the Pale Jewel-weed or the Fulvous Jewel-weed?

3. Have you even seen both kinds growing together?

4. Have you noticed the little plants when they come up in the spring?

5. What insects have you seen visiting the blossoms?

6. Have you ever seen bumble-bees biting holes in the flowers to steal the nectar?

7. Do humming-birds visit the flowers?

8. How far are the seeds thrown when you touch the pod?

9. Do you think the seeds are scattered by wind or by water in addition to being thrown from the pods?

10. Have you seen drops of dew early in the morning or of water after a rain, hanging upon the margins of the leaves?
11. Study the structure of the flower to see how cross-pollination is brought about.

(*B*) Write a description for your wild flower booklet of The Jewel-weed and its flowers, or else write a little essay with this title: How the Jewel-weed Prevents the Visits of Unbidden Guests.

(*C*) Make these drawings: The leaf of the Jewel-weed; A side view of the flower; The pod of the Jewel-weed.

(*D*) Read pages 312 to 314 of *Nature's Garden.*

WATER LILY FAMILY

NYMPHÆACEÆ

The Water Lily family may certainly claim to be the most beautiful group of aquatic wild flowers. All the members of this family are perennial herbs which are especially characterized by long, horizontal root-stocks living on or in water. The flowers have three to five sepals and five to many petals and stamens. The familiar Water Lilies of our lakes and ponds are typical illustrations of this interesting group.

WATER LILIES. It is not strange that the glorious beauty of the Water Lily has long proved a source of joy and inspiration to imaginative peoples. In various species this flower is widely distributed over the world, the Lotus of Egypt and the Orient being one sort while the Victoria Regia of the tropics is another. In our own country the white and pink varieties, though smaller than these exotic forms, are almost equally beautiful and furnish a delightful decoration to many a pond and pool. Opening during the middle of the day they reflect from their spotless and glowing petals the glory of the sunshine.

If the leaves of one of the white Water Lilies are purple on the under side it is the Sweet-

scented Water Lily, which has also a pink-flowered variety along the Atlantic Coast. If the leaves are green on both sides it is the Tuberous White Water Lily.

The structure of these wonderful blossoms is worth a few moments' study because they show so well the transition from stamens to petals. Botanists have frequently called attention to the modern belief that the floral envelopes—the sepals and the petals—have been developed through the modification of the stamens. In these little flowers we can see all stages of the process. The stamens are arranged in large circles around the centre of the blossom. Those of the inner whorl are normal in form, with perfectly developed filaments and anthers, and in the outer whorls many of the filaments are wider and flatter than the normal ones, while many of the anthers are abortive. From this beginning of the transition one can generally find in a single blossom all the stages to the perfect petal: on succeeding stamens the filament becomes wider and wider, the color becomes lighter and lighter, the anthers become smaller and smaller, until we see but the merest rudiment of an anther on one side of the petal.

Similar studies of petaloid stamens can be made in the case of many other flowers. The white blossoms of the common Syringa bush furnish excellent examples of it, and in very many of

the double cultivated flowers the transition can be seen. In these double flowers additional petals are developed through the modification of the stamens.

OBSERVATIONS FOR NOTEBOOK

WHITE WATER LILY:

(*A*) 1. Where have you seen the White Water Lilies growing?
2. Are they the Sweet-scented or the Tuberous species?
3. When are the flowers most widely open?
4. In the specimen you have can you trace the change from stamen to petal?
5. When you can observe the flowers as they grow see if there are any beetles visiting them.
6. Have you ever seen the curious roots or the curious fruits of the water lily?
7. Are there any hairs upon the stems, leaves or blossoms? Do you know of any aquatic plants that are hairy?

(*B*) Write a description of the Water Lily Blossom for your wild flower booklet. Begin with the flower-stalk and end with the pistil.

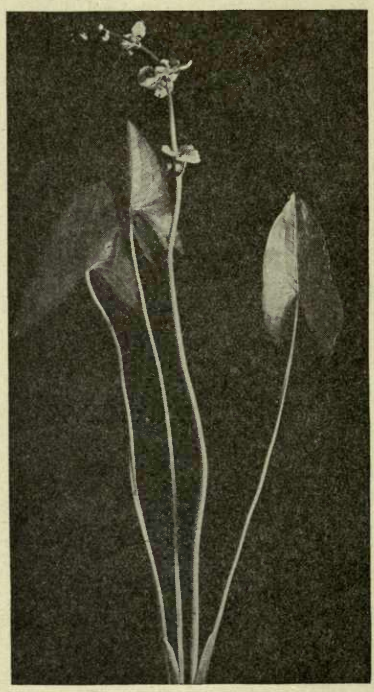
(*C*) Illustrate your booklet with these drawings: leaf and blossom of Water Lily; a series showing the transition from stamens to petals.

(*D*) Read pages 67 to 96 in *The Procession of the Flowers;* also pages 174 to 175 in *Nature's Garden.*

WATER PLANTIAN FAMILY

ALISMACEÆ

SAGITTARIA. Along the small brooks and in many swampy places the leaves and blossoms of



ARROWHEAD

the Arrowhead or Sagittaria—the Latin equivalent of the English name—give a distinctly deco-

rative touch to the summer landscape. In appearance the whole plant is so clear-cut that one must admire it. The smooth and shining stems rise from the water at a small angle from one another, bearing on their ends the triangular, sharply pointed leaves, while from between these the cleanly cut blossom-bearing stalks arise holding the pure white, sub-triangular, pollen-bearing flowers clustered along their upper ends. The seed-bearing blossoms are less conspicuous, lacking the white petals.

More than a dozen species of Sagittaria are found in the United States, though only about half of these have the distinctly arrow-shaped leaf. Most of them remain in blossom from July until September.

The Arrowheads form much the largest part of the Water Plantain family to which they belong, the other members of the group being small and inconspicuous plants living in damp situations and not generally known.

DOGBANE FAMILY

APOCYNACEÆ

DOGBANE. The Dogbane is the typical representative of the Dogbane family. It is beloved of butterflies and is one of the most attractive summer blossoming plants. The flowers are small individually but they are so grouped as to be quite conspicuous against the background of the clean green leaves. The whole plant is full of grace: the stems are smooth and rounded, with glistening bark; the leaves are oval and pointed; the pinkish-white flowers are bell-shaped; and the long pods which succeed them are slender and decorative. In its structure the blossom is somewhat like that of the Milkweed, and insects are often caught and held by the curious device by which the plant effects cross-pollination. These are usually small flies, however; the larger butterflies are able to extricate themselves from the tiny traps.

In many localities the Dogbane has become a troublesome weed in fields and pastures. Like the closely related Indian Hemp it spreads by long rootstocks as well as by the winged seeds. Both these species are poisonous.

LOBELIA FAMILY

LOBELIACEÆ

CARDINAL FLOWER. For brilliance of color no blossom in our summer fields can compare with the Cardinal Flower, which holds its flaming spikes on tall, erect stems in marshes, and along margins of brooks and ditches. It is a water lover and is to be found only where its roots can reach an abundance of moisture. Even there it is seldom very abundant; we more often see a dozen or two plants together than a greater number, and even these are likely to disappear in regions where people can easily gather them. The blossoms appear to be especially adapted to pollination by humming-birds, which love brilliant hues of red and freely visit many sorts of red flowers.

> "Along the roadside, like the flowers of gold
> That tawny Incas for their gardens wrought,
> Heavy with sunshine droops the goldenrod,
> And the red pennons of the cardinal flower
> Hang motionless upon their upright staves."

The Cardinal Flower is the most conspicuous member of the Lobelia family, which includes several other species that may frequently be found along the borders of damp woods and the margins of slow-running streams.

MINT FAMILY

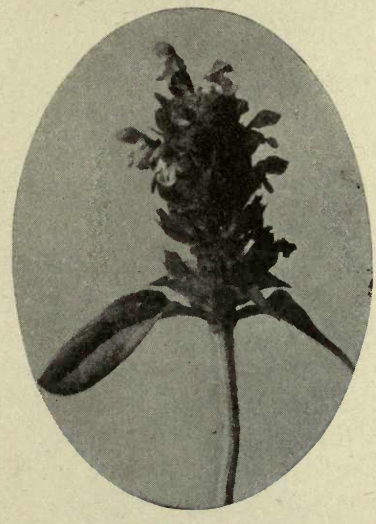
LABIATÆ

THE Mint family includes a large number of herbaceous plants which are characterized by their square stems and their simple, opposite leaves, which nearly always have aromatic and distinctive odors. The petals are united into a two-lipped corolla, to the inside of which are attached the two or four stamens. The stigma is two-lobed and the ovary is deeply cleft in two parts.

A number of common plants, which are not especially attractive as wild flowers but which are interesting and generally well known, belong to this family. Among these are the Catnip, Gill-over-the-ground, Motherwort, Oswego Tea, Pennyroyal, Peppermint, Spearmint, Wild Thyme, and Wild Bergamot.

SELF-HEAL. From early in summer until late in autumn the blue-purple flowers of the Self-heal or Heal-all are found everywhere. This plant from across the sea is splendidly equipped for the struggle for existence which all plants must undergo. It can grow in sunlight or in shadow, spreading from place to place by means of horizontal stems that take root readily, and develop-

ing great numbers of small seeds from its heads of clustered flowers, which appear to be especially adapted to receiving the visits of bumblebees. The worker bees may be found upon the flowers at almost any time, going rapidly over a head and then flying quickly to another not far



SELF-HEAL OR HEAL-ALL

away. The anthers in the upper part of the corolla dust pollen upon the head of the visiting bee and this pollen is carried from flower to flower with surprising rapidity. In early times this plant was largely used for curing diseases, a fact to which its common name is due.

OBSERVATIONS FOR NOTEBOOK

SELF-HEAL:

(*A*) 1. Does the plant thrive best in sunny or in shady situations?

2. Have you ever seen the stems that spread along the ground?

3. How can you tell that it belongs to the mint family?

4. Have you seen bumble-bees visiting the flowers? Which blossoms in a head do they visit first, the lower or the upper?

5. Examine the flower to see the way in which pollen gets upon the bee and is carried to the stigmas of other Self-Heal blossoms.

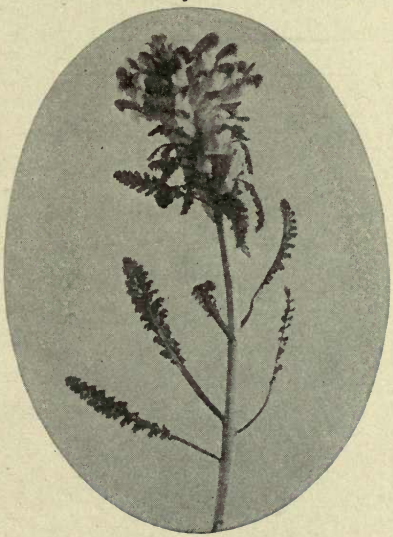
(*B*) Write a short description of the Self-Heal and illustrate it by a drawing of a flower-head.

(*C*) Read pages 45 to 46 in *Nature's Garden*.

FIGWORT FAMILY

SCROPHULARICEÆ

THE Figwort family is a large group containing a considerable variety of interesting wild flowers. These usually have the petals united



WOOD BETONY

together into a tube with two distinct lips at the outer end. There are two or four stamens and a two-celled ovary from which arises a single style that sometimes bears two stigmas. The ovaries develop into pods with a varying number of seeds.

Wood Betony. One of the most interesting members of the Figwort family is the Wood Betony, Pedicularis, Louse-wort, or Beefsteak Plant, as it is variously known. This is a low-growing plant, generally found in rather dry fields, with its blossoms in compact heads which come into flower late in spring or early in summer. The corollas are bent to one side at the outer end and so arranged in spirals that when a bumble-bee alights upon the lowest flower it can easily and rapidly visit all the others. The structure of the flower renders cross-pollination by such visitors almost certain.

"Farmers once believed that after their sheep fed on the foliage of this group of plants," writes Neltje Blanchan, "a skin disease produced by a certain tiny louse (Pediculus) would attack them —hence our innocent Betony's repellant name of Louse-wort."

Butter-and-Eggs. From the middle of July until frost the yellow blossoms of the Butter-and-Eggs are much in evidence by roadsides and in waste places. Although this plant, which is also known as Toadflax, is an importation from abroad, it has become very widely distributed in America. Its yellow flowers and light green foliage are a welcome addition to Nature's summer decorations, while the nectar that it holds in the spur below the blossom is eagerly sought by bumble-

bees. These busy creatures have long since learned the secret of opening the door that is so fast closed to most other insects. The worker bumble-bees are the only sort abundant late in summer, and the size of these blossoms is perfectly adapted to their visits. If you open the flowers you can see how the bees are dusted with pollen.

This plant spreads by means of short root-stocks which run out in all directions and take complete possession of the soil.

MULLEIN. I presume the plebeian Mullein is not often considered a beautiful plant. Yet there is a certain decorative value to it that we should miss did we not find it here and there in pasture and field. The great woolly leaves with their velvety surfaces and rounded margins seem to belong to the irregular surface of the stem, while the long head of inconspicuous blossoms and ripening fruits also carry out the idea of a plant that asks only to be let alone, except by the flying insects that come to pollinate it. It is not a plant that we gather to bring indoors as we do the Goldenrods, but it nevertheless serves a purpose in adorning the landscape.

MOTH MULLEIN. The Moth Mullein is another abundant and widely distributed plant which is worth a little attention from the nature student. The beautiful waxy white or yellowish petals have five stamens projecting from between

their bases, each of the stamens being thickly set with violet-colored hairs that give to the flower a very attractive appearance when seen through the lens. These flowers are borne in long racemes, blossoming in succession for several weeks. They

TURTLE-HEAD

are followed by conspicuous pods, from which the tiny seeds are scattered.

TURTLE-HEAD. One of the oddest blossoms of all the wild flowers is the Turtle-head or Snake-head. You may easily find it from mid-summer until late in autumn if you go to damp places along the borders of woods. The curious white

flowers are borne on leafy stems that reach a height of from one to three and more feet. Each flower is rather large and at first sight is suggestive of a Closed Gentian slightly modified. Instead of being vertical, however, it projects sideways and has a distinct mouth which the worker bumble-bees enter to reach the nectar at the bottom of the corolla. By so doing they bring about the cross-pollination of the plant. The bees often have some difficulty in entering the blossom, as you may readily see by a little watching. The anthers mature before the stigmas and thus insure cross-fertilization.

The flowers are succeeded by interesting pods which split apart to let the seeds fly out when strong winds blow the upright stalks over far enough. The seeds are flat and margined so that they are easily carried by such winds.

OBSERVATIONS FOR NOTEBOOK

Wood Betony:

(*A*) 1. In what sorts of situations have you seen the Wood Betony growing?

2. What insects have you seen visiting the flowers?

3. Do bumble-bees alight first upon the lower or the upper flowers of a given head? Do they follow the spirals?

4. Study the structure of the flower to determine these points:
   - What reward is offered to visiting bees?
   - How is this reward advertised?
   - How does the structure and position of pistils and stamens bring about cross-pollination by means of the visitors?
   - How are ants prevented from getting nectar?
   - How is the washing away of pollen and nectar prevented?

(*B*) Write a little essay for your wild flower booklet, with this title: The Bee and the Betony. Follow the outline given under 4 above.

(*C*) Illustrate by means of these drawings: Leaf of Betony; Flower-head; Sectional view from side showing structure and position of pistils and stamens.

(*D*) Read pages 85 to 90 in *Blossom Hosts and Insect Guests.*

BUTTER-AND-EGGS:

(*A*) 1. Where does this plant grow?
2. How does it spread?
3. What is the color of the leaves?
4. What insects can you find visiting the flowers?
5. How long through the season are the flowers to be found?
6. Study the structure of the flower to determine:
   - *a.* How cross-pollination is brought about.
   - *b.* How self-fertilization is prevented.
   - *c.* How unwelcome guests are excluded.

(*B*) Write a little essay for your booklet with this title: An Attractive Plant and its Insect Visitors.

(*C*) Illustrate your booklet by means of these drawings: Leaf; Stalk with several flowers upon it; Sectional view of flower from side showing position of stamens and pistil.

TURTLE-HEAD:

(*A*) 1. Does the plant thrive best in sun or shade? in dry or moist soil?

2. Have you seen bumble-bees visiting the flowers?

3. Can you find any flowers where bees have bitten holes in the corolla to steal the nectar? Watch for bees doing this.

4. Study the structure of the flower to determine:
   a. How cross-pollination is brought about.
   b. How self-fertilization is prevented.
   c. How unwelcome guests are excluded.

(*B*) Write a description of the Turtle-head and illustrate it by one or more careful drawings.

(*C*) Read pages 145 to 146 in *Nature's Garden.*

POKEWEED FAMILY

PHYTOLACCACEÆ

POKEWEED. In little clearings of the woods, especially if a recent fire has destroyed other herbaceous plants, one is pretty sure to find the Pokeweed or Garget growing in abundance. This is probably due to the fact that its seeds are largely distributed through the agency of the birds that eat the berries, and everyone knows that little glades along the borders of woods are favorite haunts of many sorts of birds. The plant comes into flower rather late in summer, the small white blossoms being visited by many sorts of bees and flies. The berries gradually mature until in September they form the conspicuous purple clusters with which most children are familiar. Then they attract the birds in numbers, giving them a rich feast to speed them on their southward way.

The Pokeweed is the only member of its family which is commonly found throughout most of the United States. It was formerly called Pigeonberry, probably because the fruit was commonly eaten by the wild pigeons which were once so abundant throughout the United States.

ST. JOHN'S-WORT AND WILD CARROT FAMILIES

ST. JOHN'S-WORT. The St. John's-wort is the prophet of the Goldenrod. Long before the fields are yellowed by the Midas touch of the latter plant they are spotted here and there by the brilliant blossoms of the Hypericum. There are many species of these, varying from tiny plants only a few inches high to the larger ones two or three feet high. The leaves of the commonest sort are small and slender, while the flowers are quite conspicuous with their golden-yellow petals and their numerous stamens. This variety is especially found in dry fields where, later in the year, it is replaced by the glorious Goldenrod. These flowers are the typical representatives of the St. John's-wort family (*Hypericaceæ*).

WILD CARROT. There is generally no need to search far for the white umbrellas of the Wild Carrot. In the older settled regions it probably occurs along the nearest roadside, if it does not overrun the fields and pastures. Yet it is a decidedly decorative plant, with its fluted columns for stems, its slender incised leaves and its mass of tiny flowers arranged in spreading heads that

attract a great variety of flies and other insects for the purpose of pollination.

The Wild Carrot is an excellent example of the large Parsley family (*Umbelliferæ*) in which many small flowers are held on rather short stems that project from a common center. It is also called the Carrot family. The cultivated carrot has been developed from this wild species, which is also called Bird's-nest and Queen Anne's Lace.

Several weeds and poisonous plants also belong to this Carrot family. Perhaps the most famous of these is the Poison Hemlock, or Poison Parsley. This is a wayside species growing sometimes to a height of six feet, having many flat-topped umbels of small white flowers, and finely cut parsley-like leaves. It is a biennial and one of the most poisonous of medicinal herbs.

COMPOSITE FAMILY

COMPOSITÆ

THE great family of plants in which the flowers are closely crowded together into a flat head, as illustrated in the case of the familiar Sunflower, is called Compositæ. This includes a large proportion of the conspicuous wild flowers found throughout the season. While the most of these blossom during the summer and autumn months a few species are much in evidence through the spring and early summer.

SPRING EVERLASTING. The Spring or Plantain Everlasting has been blessed with quite a variety of common names. It is often called the Mouse-eared Everlasting and Early Everlasting, as well as White Plantain and Pussy Toes. In New England it is commonly called Indian Tobacco, while the botanists give Ladies' Tobacco as one of its names. I think its genus name—Antennaria—a pretty one and wish the plant might be generally so called. This name was given because of the fancy that the pappus of the stamen-bearing flowers resembles the feelers or antennæ of insects.

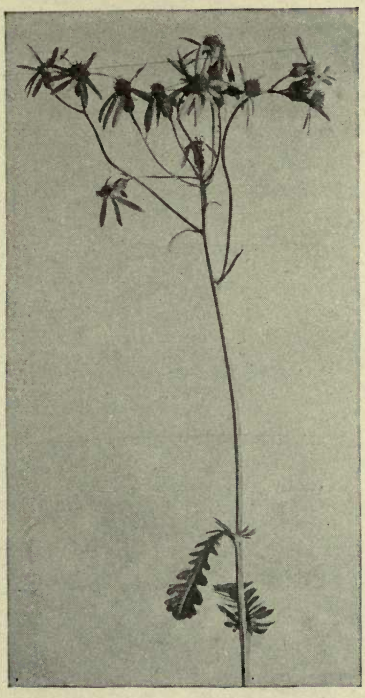
This Antennaria is a perennial, the basal rosette of the broadly oval leaves passing through

the winter and sending up in spring the woolly stems which bear upon their tips the inconspicuous white blossoms. A glance at these shows that they belong to the Composite family, in which many tiny flowers are crowded together in a single head, each stem bearing about five of these heads. A little further study shows also that the pollen-bearing and the seed-bearing flowers are upon quite distinct plants. The bracts around the base of each flower head are densely woolly like the stems, and the flower heads themselves are made dense by the erect pappus arising from each floret. By cutting a vertical section of the pistillate blossom you can easily see, through the lens, the little undeveloped achenes resting on the receptacle, each bearing the many slender vertical white hairs that make up the pappus, and the long style which projects beyond the pappus and holds the two-lobed stigma well away from them, so that when the pollen-laden insects come to the flowers the stigmas rather than the pappus receive the pollen grains.

The pollen-bearing flowers are borne in shorter, broader heads than the seed-bearing ones. The reddish or brownish anther tubes project beyond the general whiteness of the head and are tipped with the yellow pollen, so that these blossoms are comparatively conspicuous. Their stems, however, are shorter than those of the others by sev-

eral inches. Like the Dandelion the stalk of the seed head lengthens as the fruits mature.

GOLDEN RAGWORT. The Golden Ragwort is a conspicuous flower in early summer in wet



GOLDEN RAGWORT

meadows and along streams. It is a composite blossom, the ray florets being clear yellow and the central florets orange yellow. It has a distinct and rather pleasing odor.

ROBIN'S PLANTAIN. The Robin's Plantain seems to be generally a hillside or roadside flower, where its Aster-like blossoms may be seen as you walk or drive along in early June. Blue Spring Daisy is an appropriate name by which it is sometimes called. The ray florets are blue-purple while the center florets are yellow. It is a widely distributed species and one of the most interesting of the early flowering plants of the Composite family.

WHITE DAISY. The Ox-eye Daisy or White Daisy is one of the most abundant blossoms of early summer in many parts of the United States. It is a pestiferous weed in neglected meadow lands, and grows in great numbers along the roadsides. This is the flower of which Bliss Carman wrote:

> Over the shoulders and slopes of the dune
> I saw the white daisies go down to the sea;
> A host in the sunshine, a snowdrift in June,
> The people God sends us to set our hearts free.

And how beautiful they are, even if they have crowded out the grass of the meadows to the despair of the owners. They yield a rich harvest to the eyes of all discerning beholders, and may be used in unstinted abundance in interior decorations. But in the latter case they should not be crowded into jars and vases. Out of doors they

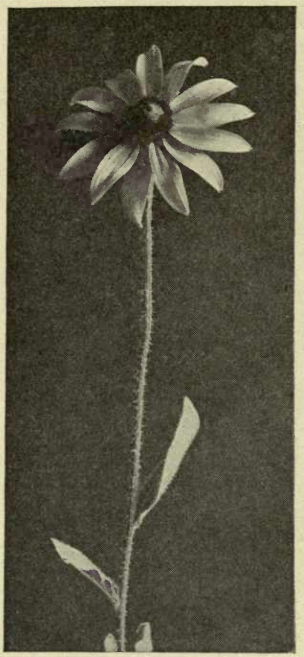
are sufficiently separated for each flower to reveal its beauty and the hint should be taken in displaying them inside.

By midsummer the members of the great family of composite plants have fairly begun their reign.

WHITE DAISIES

They abound on every hand and are conspicuous in their various tints of red, yellow and blue. In many species the flower-heads are small individually, being massed together so as to attract attention, as in the Goldenrods, and without dis-

tinctive ray florets that render the plants very conspicuous. In other species, as in the group to which the Sunflower belongs, there are distinct ray florets around the outside of the head which serve to render the flower-heads conspicuous from a distancee. Several species of the latter type come into blossom during the summer. The Rudbeckia or Cone-flower is one of these; the Coreopsis and Sneeze-weeds are others, while there are several species of the wild Sunflowers. These various blossoms show striking tones of yellow and by the road-sides or in the fields they do much to light up the summer landscape.



CONE-FLOWER

CONE-FLOWER. July is the gala month for the Cone-flowers, often called Brown-eyed Daisies and sometimes Black-eyed Susans. When they first appear in all the freshness of their brown and gold they are really very attractive. They abound in meadows and pastures as well as along

roadsides, where they make a gorgeous show of color and are visited by a great variety of insects.

CHICORY. While generally not so deep a color tone as the cerulean hue of the Fringed Gentian

CHICORY

the violet-blue petals of the Chicory blossoms may surely vie with any flowers in the tenderness and delicacy of their tints. These vary much in different blossoms as well, probably, as in the same blossom at different ages, but the petals show always a bit of beautiful color. The plant is

often also called Succory, and, as is well known, its roots are commonly used as a substitute for coffee, sometimes legitimately but more often as an unlawful adulterant. The species grows along fences and highways, coming into bloom about midsummer and remaining in blossom until frost.

TANSY. The rich, aromatic smell of the Tansy is familiar to everyone who has wandered along country lanes in summer. Starting perhaps from an old garden where it was planted early in our colonial history, the species has found its way in waste places along fields and roadsides. The small yellow flowers are so massed in heads as to become decidedly conspicuous. This leads to the visits of many short-tongued insects, although to most people there is little temptation to gather these blossoms for close inspection by sight or smell. Fortunately, children no longer have reason to hate the sight of the plant, as they did in former times when Tansy tea was commonly used as a medicine.

YARROW. The Yarrow is another plant that seems to follow civilized man wherever he may go. As it grows by our waysides it seems to have comparatively little interest for us, but nevertheless it has been associated with human history to a remarkable extent. In former times it was also largely used as a medicine.

Boneset. The Boneset is to be found during the weeks of late summer in low, wet meadows and along the borders of marshes. It may be recognized by its composite clusters of white flowers and its opposite leaves joined together at their

JOE-PYE WEED

bases, with the stem of the plant rising from the middle. In earlier years Boneset tea was largely used as a medicine and Boneset taffy was a home-made candy used as a cough cure.

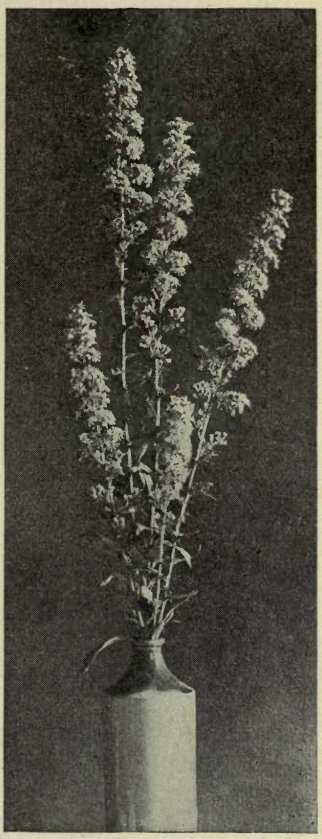
Joe-Pye Weed. During the latter part of summer the pinkish flower-heads of the Joe-Pye

weed or Purple Boneset are among the most attractive blossoms in wet places and along the borders of marshes. This is one of the Composites having no ray flowers, so that the color effect is due to tubular florets and some rows of pinkish overlapping bracts belonging to the involucre that surrounds the flower-head. In bare, dry soil it may rise three feet, while in rich, moist soil it may reach three times that height. The flowers are freely visited by butterflies and bees. Its name is due to a famous Indian medicine-man in New England, who used in it his practice.

Iron-weed. Another familiar flower of late summer and early autumn is the Iron-weed. This is easily recognized as a member of the great family of composite plants having no ray florets. Its purplish-red flower-heads are borne on short stems in such a way as to make broad clusters, on account of which the plant is called Flat Top in some localities. The flowers have a general resemblance to small thistle-heads and are freely visited by many bees and butterflies.

The Goldenrods. During the weeks of late summer and early autumn the Goldenrods are the most effective members of Nature's floral pageant. They cover the hills with a mantle of beautiful yellow; they light up the dark swamps with spots of glowing gold; they fringe the roadsides with tassels of inimitable grace; they dot the open

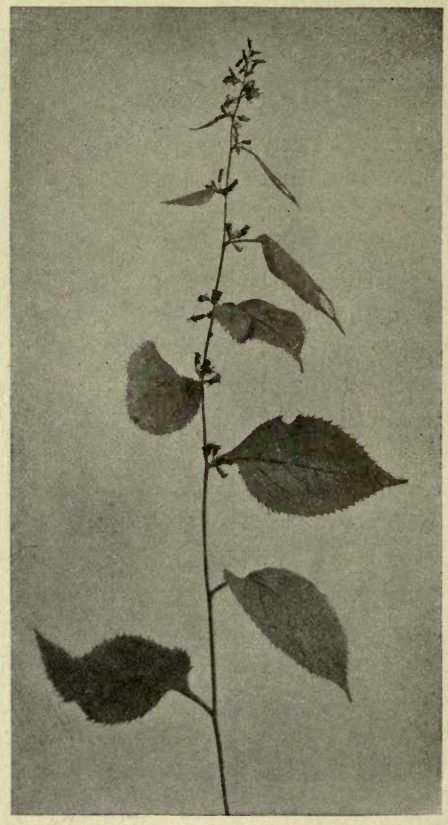
woods with miniature circles of golden beauty. It has well been argued that no other flower has so just and fitting a claim to be considered our national emblem.



BICOLORED GOLDENROD

The ubiquity of the Goldenrod is largely due to the fact that there are many species, each in general adapted to a particular sort of situation. The first to tell us that midsummer is at hand and autumn not far off is the Early, or Sharp-toothed Goldenrod, which in some regions comes into blossom in June. It is often closely followed by the Cut-leaved Goldenrod, while soon after a host of species come into bloom. The Canada Goldenrod is one of the most abundant and widely distributed of these. It is a splendid plant, sometimes reaching the height of a tall man, though

more commonly but three or four feet high. In an open spot in the woods one day I saw a



ELM-LEAVED GOLDENROD

clump of brilliant Goldenrods having the flowers distributed up and down the vertical stem in a

most beautiful fashion. It was the Bicolored Goldenrod, and was one of the most decorative plants I ever saw; for weeks it remained a joy to all beholders.

SEASIDE GOLDENROD

It is well known that when a plant grows in shady places it is likely to have a greater leaf area than when it grows in the open sunshine. It must have a larger surface to collect the light when the latter is comparatively dim. Now most of the Goldenrods live in the open fields, having rather narrow leaves; but the exquisite Elm-leaved Goldenrod lives in woods and copses, where the shadows are thick and direct sunshine is a fleeting thing. And so we find that this species has the broad, thin leaves of a shade-plant, leaves with well developed stems, but otherwise so similar to those of the Elm tree as to give this Goldenrod its distinctive name. But it adds a touch of color to the somber shades of the woods that we should not willingly do without.

Many of the Goldenrods are so similar in appearance that it is difficult to distinguish the species, but the Lance-leaved variety is so distinct that it can be told at a glance. It belongs in fact to such a different type of plant that the botanists have placed it in a genus distinct from that of the true Goldenrods. The long narrow leaves with smooth margins have no stems, and the fragrant flowers are borne in clustered heads that give the plant the appearance of having a flat top. Because of this the variety is not nearly so attractive as many of the true Goldenrods.

With the many people who pass the summer months along the shores of the Atlantic, the Sea-side Goldenrod is an especial favorite. This species is more robust than most of the others, and its great masses of golden flowers stand out in bold relief along the borders of the salt marshes or against the background of the sea. It was a favorite of Celia Thaxter's, whose beautiful lines will always give the plant an especial charm:

> Graceful, tossing plumes of glowing gold,
> Waving lonely on the rocky ledge;
> Leaning seaward, lovely to behold,
> Clinging to the high cliff's ragged edge.

ASTERS. September and October are the show months for the great group of native Asters. Their violet-blue tints make a perfect comple-

WHITE ASTER

mentary color harmony with the yellow hues of the Goldenrods, so Nature seems bent upon getting the most delightful results as she brings her season's pageant to an end. Many of the early Asters may be found blossoming in August, but the most typical and attractive kinds make their chief display in September and linger through the greater part of October. The species called the New England Aster—although it has a much wider range than this name would indicate—is perhaps as general a favorite as any. It bears in great profusion thick masses of violet or purple blossoms that light up the fields and roadsides most charmingly.

Several of the Asters are named according to the shape of their leaves. The Heart-leaved Aster has rather small flowers with the rays of a blue-lavender tint; its stems are branching, each branch bearing a cluster of blossoms. The Wavy-leaved Aster is so called because of the irregular margins of the leaves. It grows in pastures along the borders of woods and bears lavender-purple flowers. The leaves of the Long-leaved Aster are very slender; it bears violet blossoms in profusion and is especially found in wet places. There are many other species of the genus, some bearing white and others purple blossoms.

NEW ENGLAND ASTER

OBSERVATIONS FOR NOTEBOOK

SPRING EVERLASTING:

(*A*) 1. In what sorts of situations do the plants grow?
2. Can you distinguish between the pollen-bearing and the seed-bearing flower-heads?
3. Which are the taller?
4. Do the two kinds ever come from the same root?
5. What insects can you find visiting the flowers?
6. Do you find any ants getting nectar from the blossoms?

(*B*) Make a careful drawing of a flower-stalk of the pollen-bearing form and another of a flowering stalk of the seed-bearing form.

WHITE DAISY:

(*A*) 1. How early do the first Daisy blossoms appear?
2. Does the plant grow from seed the same year that it blossoms?
3. Do you know how the young Daisy plants look late in summer and early in autumn?
4. What insects visit the flowers?
5. How may the plants be kept out of meadows and pastures?

(*B*) Make a careful drawing of one or more Daisy flowers with rather long stems, putting the drawing toward the left margin of the sheet and at the right of it print the verse by Bliss Carman given on page 212.

CONE-FLOWER AND OTHER COMPOSITES:

(*A*) 1. Make for your wild flower booklets a careful drawing of each of the composite plants studied, labeling each drawing carefully and expressing as well as you are able the particular characteristics of each plant.

(*B*) Read pages 67 to 70 in *Blossom Hosts and Insect Guests.*

GOLDENRODS:

(*A*) 1. How many different kinds of Goldenrods can you find in your locality?
2. In what ways do they differ from one another?
3. Make a list of as many different insects as you can find visiting the Goldenrod blossoms.
4. Do you think the Goldenrod might well be adopted as the national flower of America?

(*B*) Write a little essay with the title Goldenrods I Have Seen. Tell where you have found each kind and which you consider the most beautiful.

(*C*) Illustrate your essay with careful drawings of at least three kinds of Goldenrod.

ASTERS:

(*A*) Apply the above outline for the Goldenrods to the Asters.

GENTIAN FAMILY

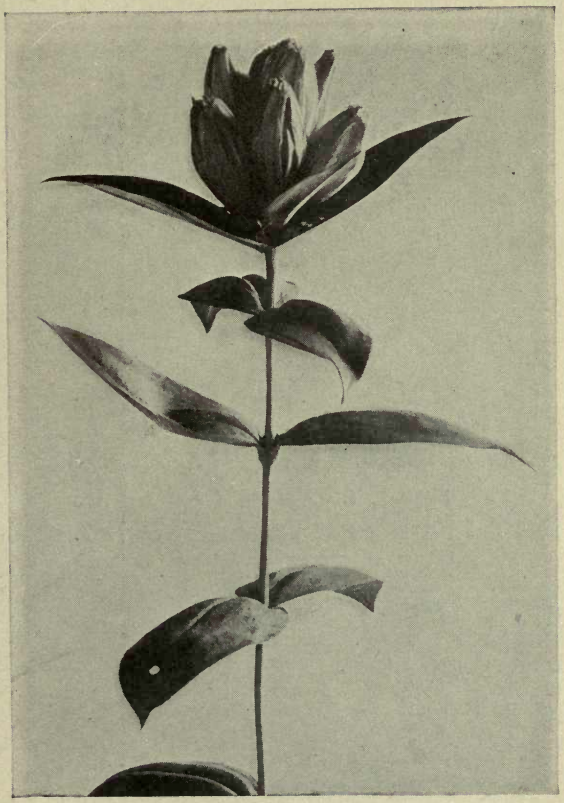
GENTIANACEÆ

THE members of the Gentian family have the petals united into a corolla with as many stamens as there are lobes of the corolla and with simple, opposite leaves which are sessile and without stipules. The ovary is free and it develops into a pod with many small seeds. The typical members of this group are the Gentians, of which several species are found in the United States. Only two of these, however, are so abundant and widely distributed as to require special mention in this connection.

CLOSED GENTIAN. The Closed Gentian, which is also often called the Bottle Gentian, is one of the most interesting blossoms of the late summer and early autumn season. Its general appearance is well shown in the picture, the tubular corollas being blue, although the precise color tone varies largely in different flowers and in different ages of the same flower. These blossoms are freely visited by worker bumble-bees, which pry open the corolla lobes and enter the flower bodily.

FRINGED GENTIAN. As the dainty Mayflower is the most prized of the early blossoms, full of promise for the coming days, so the Fringed

Gentian is the most precious of the late flowers, full of the glory of the perfected season. In



CLOSED GENTIAN

structure this plant is very similar to the nearly related Closed Gentian, but in the latter the fringed petals that give so much beauty when

unfolded are crowded together to close the mouth of the blossom. Many who have never seen the flower growing in its native haunts have learned to love it through those exquisite lines by Bryant:

> Thou waitest late and com'st alone,
> When woods are bare and birds are flown,
> And frosts and shortening days portend
> The aged year is near his end:
> Then doth thy sweet and quiet eye
> Look through its fringes to the sky,
> Blue, blue,—as if that sky let fall
> A flower from its cerulean wall.

These lines are beautiful even though their entire accuracy as to time of the flower's appearance has been questioned by the naturalist, and their accuracy to its color has been questioned by the artist. We must allow the poet a little of his proverbial license, although we need not let him blind us to the facts of Nature.

Blue is a favorite color with all the bees, so one might easily guess that these violet-blue blossoms are visited by bumble-bees. The anthers shed their pollen before the stigmas mature, so that cross-pollination is easily brought about. And the delicate fingers which add so much beauty to the blossoms seem also to be of decided service to the plant in keeping out ants and other unwelcome crawling insects, thus preventing the robbery of nectar.

When we realize that the Fringed Gentian grows only from seed, requiring two seasons to develop, we can easily see how it happens that the plant is so often exterminated near villages. The flowers are so beautiful that people feel they must gather them, and so there is no chance for the seed to develop to start the next year's plants. If we are to enjoy the flowers year after year we must leave enough of them on their stalks to insure a crop of seed each season.

OBSERVATIONS FOR NOTEBOOK

CLOSED GENTIAN:

(*A*) 1. Where do you find the Closed Gentian growing?
2. Is the soil wet or dry?
3. What variation is there in the number of blossoms on a plant?
4. Are the flowers on a single plant always of the same color?
5. Is the color around the outer end of the blossom the same in young as it is in older flowers?
6. Have you seen any bumble-bees visiting the flowers?
7. Do you find any blossoms with holes eaten in the corolla, where bumble-bees have stolen nectar before the flowers were fully developed?
8. Did the stamens mature before the pistils or vice versa?

(*B*) Write a short description of The Closed Gentian for your wild flower booklets, following this outline:

Stem.
Leaves.
Flowers.
  Calyx.
  Corolla.
  Stamens.
  Pistil.
Insect visitors.
How unwelcome visitors are excluded.

(*C*) Illustrate your essay by drawing one or more of the flowers as seen upon the plant, and a sectional view of a single flower.

(*D*) Read the account of the Closed Gentian on pages 92 to 94 of *Ten New England Blossoms and their Insect Visitors.* Read also the delightful little story by Mrs. Annie Trumbull Slosson, entitled "The Little Shet-up Posy" in her book, Story-Tell Lib.

FRINGED GENTIAN:

(*A*) 1. In what sort of localities does the Fringed Gentian grow?
2. How is it adapted to pollination by bumble-bees?
3. Is the color of the flower a sky-blue or a violet-blue?

(*B*) Make a careful drawing of stem, leaf and flower, and copy into your booklet the verse by the poet Byrant printed on page 230.

(*C*) If you have access to the bound volumes of the *Garden Magazine* read the account of the successful growing of the Fringed Gentian as a cultivated plant, on pages 210 to 212 of volume two.

A LIST OF THE WILD FLOWERS DISCUSSED IN THIS BOOK IN THE SEQUENCE OF GRAY'S MANUAL OF BOTANY, WITH THEIR SCIENTIFIC NAMES.

CROWFOOT FAMILY

RANUNCULACEÆ

Round-lobed Hepatica	Hepatica triloba
Sharp-lobed Hepatica	Hepatica acutiloba
Marsh Marigold	Caltha palustris
Wood Anemone	Anemone quinquefolia
Rue Anemone	Anemonella thalictroides
Wild Columbine	Aquilegia Canadensis
Red Baneberry	Actæa spicata
White Baneberry	Actæa alba
Goldthread	Coptis trifolia
Tall Meadow Rue	Thalictrum polygamum
Tall Buttercup	Ranunculus acris

BARBERRY FAMILY

BERBERIDACEÆ

May Apple	Podophyllum peltatum

WATER LILY FAMILY

NYMPHÆACEÆ

White Water Lily	Nymphæa odorata
Tuberous Water Lily	Nymphæa reniformis

PITCHER PLANT FAMILY

SARRACENIACEÆ

Pitcher Plant	Sarracenia purpurea

POPPY FAMILY

PAPAVERACEÆ

Bloodroot	Sanguinaria Canadensis
Dutchman's Breeches	Dicentra Cucullaria
Squirrel Corn	Dicentra Canadensis

MUSTARD FAMILY

CRUCIFERÆ

Two-leaved Toothwort	Dentaria diphylla
Cut-leaved Toothwort	Dentaria laciniata

VIOLET FAMILY

VIOLACEÆ

Bird's-foot Violet	Viola pedata
Early Blue Violet	Viola palmata
Common Blue Violet	Viola cucullata
Arrow-leaved Violet	Viola sagittata
Sweet White Violet	Viola blanda
Lance-leaved Violet	Viola lanceolata
Primrose-leaved Violet	Viola primulæfolia
Round-leaved Violet	Viola rotundifolia
Downy Yellow Violet	Viola pubescens
Canada Violet	Viola Canadensis
Long-spurred Violet	Viola rostrata
American Dog Violet	Viola canina

PURSLANE FAMILY

PORTULACACEÆ

Common Portulaca	Portulaca oleracea
Virginia Spring Beauty	Claytonia Virginica
Carolina Spring Beauty	Claytonia Caroliniana

GERANIUM FAMILY

GERANIACEÆ

Wild Geranium	Geranium maculatum
Herb Robert	Geranium Robertianum

JEWEL-WEED FAMILY

BALSAMINACEÆ

Pale Jewel-weed	Impatiens pallida
Spotted Jewel-weed	Impatiens fulva

MILKWORT FAMILY

POLYGALACEÆ

Fringed Polygala	Polygala paucifolia

ROSE FAMILY

ROSACEÆ

Northern Wild Strawberry	Fragaria vesca
Wild Strawberry	Fragaria Virginiana
Norway Cinquefoil	Potentilla Norvegica
Common Cinquefoil	Potentilla Canadensis
Silvery Cinquefoil	Potentilla argentea
Barren Strawberry	Waldsteinia fragarioides

SAXIFRAGE FAMILY

SAXIFRAGACEÆ

Early Saxifrage	Saxifraga Virginiensis
Swamp Saxifrage	Saxifraga Pennsylvanica
False Mitrewort	Tiarella cordifolia
Common Mitrewort	Mitella diphylla
Smaller Mitrewort	Mitella nuda

EVENING PRIMROSE FAMILY

ONAGRACEÆ

Evening Primrose	Œnothera biennis

PARSLEY FAMILY

UMBELLIFERÆ

Wild Carrot	Daucus carota
Poison Hemlock	Conium maculatum

DOGWOOD FAMILY

CORNACEÆ

Bunchberry	Cornus Canadensis

HONEYSUCKLE FAMILY

CAPRIFOLIACEÆ

Twin Flower	Linnæa borealis

MADDER FAMILY

RUBIACEÆ

Bluets	Houstonia coerulea
Partridge Berry	Mitchella repens

COMPOSITE FAMILY

COMPOSITÆ

Spring Everlasting	Antennaria plantaginifolia
Golden Ragwort	Senecio aureus
Robin's Plantain	Erigeron bellidifolius
White Daisy	Chrysanthemum Leucanthemum
Cone-flower	Rudbeckia hirta
Chicory	Cichorium Intybus
Tansy	Tanacetum vulgare
Yarrow	Achillea Millefolium
Joe-Pye Weed	Eupatorium purpureum
Boneset	Eupatorium perfoliatum
Ironweed	Vernonia Noveboracensis
Wavy-leaved Aster	Aster Cordifolius
Heart-leaved Aster	Aster undulatus
New England Aster	Aster Novæ-Angliæ
Long-leaved Aster	Aster longifolius
Lance-leaved Goldenrod	Solidago lanceolata
Bicolored Goldenrod	Solidago bicolor
Elm-leaved Goldenrod	Solidago ulmifolia
Seaside Goldenrod	Solidago sempervirens
Cut-leaved Goldenrod	Solidago arguta
Canada Goldenrod	Solidago Canadensis

LOBELIA FAMILY

LOBELIACEÆ

Cardinal Flower	Lobelia cardinalis

HEATH FAMILY

ERICACEÆ

Trailing Arbutus	Epigæa repens

WINTERGREEN FAMILY

PYROLACEÆ

One-flowered Pyrola	Moneses grandiflora
Elliptical-leaved Pyrola	Pyrola elliptica
Round-leaved Pyrola	Pyrola rotundifolia

INDIAN PIPE FAMILY

MONOTROPACEÆ

Indian Pipe	Monotropa uniflora
Pinesap	Monotropa Hypopitys

PRIMROSE FAMILY

PRIMULACEÆ

Shooting Star	Dodecatheon Meadia
Star Flower	Trientalis Americana
Golden Loosestrife	Lysimachia vulgaris
Spotted Loosetrife	Lysimachia punctata
Creeping Loosetrife	Lysimachia Nummularia
Four-leaved Loosetrife	Lysmachia quadrifolia
Pimpernel	Anagallis arvensis

DOGBANE FAMILY

APOCYNACEÆ

Dogbane	Apocynum androsæmifolium

GENTIAN FAMILY

GENTIANACEÆ

Fringed Gentian	Gentiana crinita
Closed Gentian	Gentiana Andrewsii

PHLOX FAMILY

POLEMONIACEÆ

Moss Pink	Phlox subulata

FIGWORT FAMILY

SCROPHULARIACEÆ

Common Mullein	Verbascum Thapsus
Moth Mullein	Verbascum Blattaria
Butter-and-Eggs	Linaria vulgaris
Turtlehead	Chelone glabra
Wood Betony	Pedicularis Canadensis

MINT FAMILY

LABIATÆ

Self-Heal	Brunella vulgaris

POKEWEED FAMILY

PHYTOLACCACEÆ

Pokeweed	Phytolacca decandra

BIRTHWORT FAMILY

ARISTOLOCHIACEÆ

Pipe Vine	Aristolochia Sipho
Common Wild Ginger	Asarum Canadense
Long-tipped Wild Ginger	Asarum acuminatum
Short-lobed Wild Ginger	Asarum reflexum

ORCHID FAMILY

ORCHIDACEÆ

Pogonia	Pogonia ophioglossoides
Ladies' Tresses	Spiranthes cernua
Large Purple Fringed Orchis	Habenaria fimbriata
Ram's-Head Lady's-slipper	Cypripedium arietinum
Small Yellow Lady's-slipper	Cypripedium parviflorum
Large Yellow Lady's-slipper	Cypripedium pubescens
Showy Lady's-slipper	Cypripedium spectabile
Pink Lady's-slipper	Cypripedium acaule

IRIS FAMILY

IRIDACEÆ

Larger Blue Flag	Iris versicolor
Blue-Eyed Grass	Sisyrinchium angustifolium

LILY FAMILY

LILIACEÆ

Large-flowered Bellwort	Uvularia grandiflora
Perfoliate Bellwort	Uvularia perfoliata
Sessile-leaved Bellwort	Oakesia sessilifolia
Tiger Lily	Lilium tigrinum
Philadelphia Lily	Lilium Philadelphicum
Southern Red Lily	Lilium Catesbæi
Canada Lily	Lilium Canadense
Turks-cap Lily	Lilium superbum
Carolina Lily	Lilium Carolinianum
Dog's-tooth Violet	Erythronium Americanum
White Adder's Tongue	Erythronium albidum

LILY-OF-THE-VALLEY FAMILY

CONVALLARIACEÆ

Asparagus	Asparagus officinalis
Yellow Clintonia	Clintonia borealis
White Clintonia	Clintonia umbellata

Clasping-leaved Twisted-stalk	Streptopus amplexifolius
Sessile-leaved Twisted-stalk	Streptopus roseus
False Solomon's Seal	Smilacina racemosa
Star-flowered Solomon's Seal	Smilacina stellata
Wild Lily-of-the-Valley	Maianthemum Canadense
Hairy Solomon's Seal	Polygonatum biflorum
Smooth Solomon's Seal	Polygonatum giganteum
Cucumber-root	Medeola Virginica
Sessile-flowered Trillium	Trillium sessile
Prairie Wakerobin	Trillium recurvatum
Birthroot	Trillium erectum
Large-flowered Wakerobin	Trillium grandiflorum
Nodding Trillium	Trillium cernuum
Snowy Trillium	Trillium nivale
Painted Trillium	Trillium erythrocarpum

SPIDERWORT FAMILY

COMMELINACEÆ

Spiderwort	Tradescantia Virginica

WATER PLANTAIN FAMILY

ALISMACEÆ

Arrowhead	Sagittaria variabilis

ARUM FAMILY

ARACEÆ

Jack-in-the-Pulpit	Arisæma triphyllum
Green Dragon	Arisæma Dracontium
Swamp Cabbage	Symplocarpus fœtidus
Marsh Calla	Calla palustris

INDEX

PAGE

Adder's Tongue, Yellow..... 102
White 102
Alismaceæ 192
Anemone, Rue..... 39
Wood 37, 51
Antennaria 209
Apocynaceæ 194
Araceæ..... 60
Aristolochiaceæ..... 157
Arrowhead 192
Arum Family 60
Water..... 68
Asparagus..... 126
Aster, New England..... 224
Heart-leaved 224
Wavy-leaved 224
Asters 222, 227

Baby's Breath 133
Balsaminaceæ 186
Baneberry, Red..... 46
White 44
Barberry Family..... 97
Beefsteak Plant 200
Bellwort, Large flowered .. 103
Perfoliate..... 103
Sessile-leaved 103
Bellworts..... 103, 111
Berberidaceæ 97
Birthwort 124
Birthwort Family..... 157
Bloodroot..... 54, 59
Blue-eyed Grass 150
Stout 151
Eastern 151
Blue Flag 148
Bluets 131, 135
Boneset 217
Purple..... 218

PAGE

Bunchberry..... 167
Butter-and-Eggs..... 200, 204
Buttercup 19, 48

Calla, Marsh..... 68
Calopogon 177
Caprifoliaceæ 180
Cardinal Flower 195
Carrot, Wild..... 207
Chicory 215
Cinquefoil, Common..... 93, 96
Norway 94
Rough..... 94
Silvery 93
Clintonia, White 115
Yellow 113, 127
Columbine, Wild..... 41, 51
Commelinaceæ 99
Compositæ 209
Composite Family..... 209
Cone-flower 214, 227
Convallariaceæ 113
Cornel, Dwarf 167
Cowslip 36
American..... 160
Cranesbill, Spotted..... 153
Crowfoot Family..... 31
Cruciferæ 97
Cucumber-root 120

Daisy, Ox-eye..... 212
White..... 212, 226
Dandelion 27
Dicentra..... 58
Dogbane..... 194
Family 194
Dog's-tooth Violet 100, 110
Dogwood Family 167
Dwarf Pink..... 133

PAGE

Early Saxifrage 72, 75
Elliptical-leaved Pyrola.. 87
Ericaceæ 82
Evening Primrose 23
Everlasting, Early..... 209
Mouse-eared 209
Spring..... 209

False Beech Drops..... 89
Rue Anemone..... 40
Solomon's Seal..... 115
Figwort Family..... 199
Flat Top..... 218
Foam-flower 72, 75

Garget 206
Gentian, Bottle..... 228
Closed..... 228
Fringed..... 228, 232
Gentianaceæ 228
Gentian Family 228
Geraniaceæ 153
Geranium Family 153
Geranium, Wild..... 153, 155
Goldenrod, Bicolored..... 219
Canada..... 219
Cut-leaved 219
Early..... 219
Elm-leaved..... 221
Lance-leaved..... 222
Sea-side 222
Sharp-toothed..... 219
Goldenrods 218, 227
Goldthread 46, 52
Green Dragon 68

Heal-all..... 196
Heath Family..... 82
Hemlock, Poison 208
Hepatica..... 31, 49
Herb Robert 155
Honeysuckle Family 180
Hypericaceæ 207

Indian Pipe 89
Family.. 89

PAGE

Indian Tobacco..... 209
Innocence..... 133
Iridaceæ 148
Iris Family 148
Iris, Wild..... 148
Ironweed 218
Ivy, Poison 14

Jack-in-the-Pulpit 65, 70
Jewel-weed, Fulvous 187
Pale 187
Spotted..... 187
Joe-Pye Weed 217

Labiatæ..... 196
Ladies' Tresses 177
Lady's-slipper, Pink.....171, 179
Ram's-head 176
Showy..... 175
Yellow 175
Liliaceæ 100
Lily, Canada 106, 111
Carolina..... 110
Philadelphia 108
Red 110
Tiger..... 110
Turk's-cap 109
Wood 108
Yellow 107
Lily Family 100
Lily-of-the-Valley 127
Family..... 113
Wild 117, 128
Linnæa..... 180
Liver-leaf 31
Round-lobed..... 34
Sharp-lobed 34
Liverwort 33
Lobeliaceæ 195
Lobelia Family 195
Loosestrife 160
Creeping 161
Four-leaved 161
Golden 161
Yellow 160
Spotted..... 161

	PAGE
Lords and Ladies	66
Louse-wort	200
Madder Family	131
Mandrake	97
Marsh Calla	68
Marigold	34, 50
May Apple	97
Mayflower	82
Meadow Rue	48
Milkwort Family	164
Mint Family	196
Mitrewort, False	72
Two-leaved	74
Smaller	74
Moccasin Flower	171
Moneywort	161
Monotropaceæ	89
Moss Pink	99
Mullein	201
Moth	201
Mustard Family	97
Nymphæaceæ	189
Orchidaceæ	171
Orchid Family	171
Purple-fringed	177
Papaveraceæ	54
Parsley Family	208
Poison	208
Partridge Vine	134, 136
Pasture Thistle	26
Pedicularis	200
Pepper-root	97
Phlox Family	99
Phytolaccaceæ	206
Pimpernel	161
Pine Sap	89
Pitcher Plant	182
Family	182
Plantain, Robin's	212
Pogonia	177
Poison Ivy	14
Pokeweed Family	206
Polemoniaceæ	99
Polygala, Fringed	164
Polygalaceæ	164
Poppy	54
Family	54
Portulacaceæ	77
Primulaceæ	160
Primrose Family	160
Purslane Family	77
Pussy Toes	209
Pyrola, One-flowered	87
Elliptical-leaved	87
Round-leaved	87
Pyrolaceæ	86
Quaker Bonnets	132
Ladies	131
Ragwort, Golden	211
Ranunculaceæ	31
Rosaceæ	91
Robin's Plantain	212
Rose Family	91
Rue Anemone	39
False	40
Sagittaria	192
St. John'swort	207
Family	207
Sarracenia	182
Sarraceniaceæ	182
Saxifragaceæ	71
Saxifrage, Early	72
Swamp	72
Family	71
Scrophulariaceæ	199
Self-heal	196
Shooting Star	160
Silver-leaf	186
Skunk Cabbage	60, 69
Snake-head	202
Soldier's Cap	58
Solomon's Seal, False	115
Hairy	119
Smooth	120
Star-flowered	115

PAGE

Spring Beauty, Carolina..... 77
Virginia..... 77
Everlasting..... 209, 226
Squirrel Corn..... 58
Star-flower..... 161
Spiderwort..... 97
Sunflower..... 28
Swamp Cabbage..... 60

Tansy..... 216
Tiarella..... 72
Toadflax..... 200
Toothwort, Cut-leaved..... 97
Two-leaved..... 97
Touch-me-not..... 186
Trailing Arbutus..... 82
Trillium, Ill-scented..... 124
Nodding..... 125
Painted..... 124
Purple..... 126
Sessile-flowered..... 125
Snowy..... 121
White..... 122
Winter..... 122
Trout Lily, Yellow..... 100
Turtle-head..... 202, 205
Twin-berry..... 134
Twin-flower..... 180
Twisted-stalk..... 118

Umbelliferæ..... 208

Violaceæ..... 137
Violet, Arrow-leaved..... 140
Birds-foot..... 141
Canada..... 144
Coast..... 141

PAGE

Violet, Common Blue..... 138
Dog..... 144
Dog's-tooth..... 100
Downy Yellow..... 143
Early Blue..... 140
Hooded Blue..... 138
Kidney-leaved..... 142
Lace-leaved..... 143
Long-spurred..... 145
Ovate-leaved..... 140
Prairie..... 141
Primrose-leaved..... 143
Round-leaved..... 143
Smoothish Yellow..... 143
Sweet White..... 142
Violet Family..... 137

Wakerobins..... 121
Water Arum..... 68
Water Lily, Sweet Scented.. 189
Tuberous..... 190
Family..... 189
Water Plantain Family... 192
White Hearts..... 58
White Plantain..... 209
Wild Columbine..... 41, 51
Wild Ginger..... 157
Long-tipped..... 159
Short-lobed..... 159
Wild Strawberry..... 92, 94
Wild Spikenard..... 115, 127
Wintergreen Family..... 86
Wood Anemone..... 37, 51
Wood Betony..... 200, 203

Yarrow..... 216

14 DAY USE
RETURN TO DESK FROM WHICH BORROWED
BIOLOGY LIBRARY

This book is due on the last date stamped below, or on the date to which renewed.
Renewed books are subject to immediate recall.

MAY 1 1 1966	
MAY 3 1966	
MAY 3 0 1973	
JUN - 1 1973 2 0	

LD 21–50*m*-6,'59
(A2845s10)476

General Library
University of California
Berkeley

U.C. BERKELEY LIBRARIES
C026084615

Acc. 13–100m-7,'40 (7023)

QK118
W4
Biology
Library

NIA LIBRARY